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# PROGRESS OF ALASKAN TOPOGRAPHIC SURVEYS (BY THE UNITED STATES GEOLOGICAL SURVEY)

BY

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(Two maps opposite p. 560.)

The first rumor of land to the east of Siberia reached St. Petersburg during the early part of the eighteenth Century. Peter the Great, then Czar of Russia, realized at once the importance of such a discovery and in 1728 sent out an expedition under Vitus Bering to verify this rumor. Sailing along the east coast of Siberia to East Cape,† Bering steered to the northeast for one day, when, without sighting land, he returned to port.

Subsequent trips were made by Russian explorers, but it was not until 1741 that Bering, while on another trip, discovered Alaska, first sighting Mount St. Elias, now a cornerstone on the eastern boundary of the Territory. The report of valuable furs in the islands to the east of Kamchatka which was brought by Bering's crew led many Siberian fur hunters to these islands and the adjacent mainland. It was through the daring fur traders that the world first learned of the Aleutian Islands.

* Published by permission of the Director, United States Geological Survey.

† In 1898, by command of the Emperor of Russia, the name of East Cape, the most eastern point of Asia (Siberia), was changed to Cape Deshnef in honor of the explorer who discovered it. The new name has now appeared for years on all or nearly all of the maps published in continental Europe, on many maps printed in the United Kingdom and in authoritative gazetteers and encyclopedias. The latest edition of the *Encyclopædia Britannica* has Cape Dezhnev (East Cape) on its map of Asia but East Cape in its text. Many geographical societies are using the new name and this seems certain to become the common usage.—EDITOR.

Practically nothing was accomplished in obtaining geographical data until 1778, when Captain Cook, the noted English explorer, sailed along the west coast of North America in search of the much-debated Northwest Passage. He was not successful in discovering a passage to Hudson Bay, but in a single summer he obtained much more valuable data than all previous explorers. He made the first systematic surveys of any part of what is now Alaska. He outlined the larger coastal features from 58° to 70° N. L., and his maps were for many years the only ones of much of this coast.

In 1793-94 George Vancouver, also an English explorer, charted the coast between 35° and 60° N. L., and in the two seasons executed a survey of thousands of miles of shore line. Considering that the narrow and intricate waterways of the Alexander Archipelago were traversed with sailing vessels and row boats and that the instruments and methods employed were inferior to those in present use, Vancouver's surveys in extent and accuracy are little less than marvelous.

Exploring and charting the coast line were gradually continued by Spanish, English, and Russian Naval officers, members of the Russian-American Fur Company, and others, until in 1837 the entire coast had been mapped in a general way. Explorations were made of the lower parts of the Yukon, the Kuskokwim, and the Susitna rivers by the Russian Company in extending its fur trade.

The first white men to travel entirely across Alaska were members of a Western Union Telegraph Expedition who, in 1867, made a traverse of the Yukon River from Nulato to Fort Yukon. They thus established the identity of the Yukon of the Hudson Bay Company in the east with the Kwikpak of the Russians in the west.

At the time Alaska was purchased from Russia the entire coast line had been mapped with varying degrees of accuracy. The lower reaches of the Yukon, the Kuskokwin, and the Susitna rivers had been explored and sketched, and a foot-traverse made of the Yukon from Nulato to Fort Yukon. Of the remainder of the interior little was known and the general impression prevailed that the Territory was a land of ice and snow. This is not surprising, since nearly the entire coast from Cross Sound to Cook Inlet is flanked by a bulwark of high and rugged mountains covered deeply by snow in winter which remains until late into the summer and in many instances throughout the year.

The first official map of Alaska by the United States Government was compiled for the State Department by the Coast and Geodetic Survey in 1867, and shows our great lack of knowledge of the interior

at that time. Soon after the transfer of the Territory systematic surveys of the coast were inaugurated by the Coast and Geodetic Survey, on which it has been actively engaged ever since. During the eighties a few expeditions in charge of officers of the Army, Navy, Revenue Cutter Service, and others were made along the principal rivers. Among these officers were Lieut. Schwatka and Lieut. Allen of the Army, Lieut. Stoney of the Navy, and Lieut. Cantwell of the Revenue Cutter Service. In 1883, Schwatka made a complete traverse of the Yukon, which for years remained the only authentic data of the entire river. Lieut. Allen's expedition was the most remarkable one in the history of the Territory. Landing at the mouth of the Copper River, he proceeded up the Copper, across to the Tanana, and down this stream to the Yukon, then across to the Koyukuk, which he explored from the Arctic Circle to the Yukon. Crossing from the lower Yukon to Norton Sound, he reached St. Michael after a journey of over one thousand miles. In the north, Stoney and Cantwell explored the Kobuk River, and a member of Stoney's party crossed to the Colville, thence to the Chipp, which he followed to the Arctic Ocean, being the first white man to cross northern Alaska. While some of these expeditions were remarkable feats of daring and hardships, geographically the results were limited, since they were surveys of but very narrow belts along the rivers.

While a somewhat more exact geographic knowledge of the Territory gradually developed through the information received from the hardy prospectors and fur traders as well as from official sources, it was not until 1895, nearly thirty years after its purchase, that Congress awoke to the importance of more systematic surveys of the interior and the investigation of Alaska's mineral wealth. The investigation of the mineral resources of the Territory has been intrusted to the United States Geological Survey. The investigation of the mineral resources demand that geological surveys be made and the successful correlation and study of the data acquired necessitate the construction of base maps of the areas covered by the investigations.

The work of the United States Geological Survey in Alaska from the accession of the Territory up to and including 1904 has been described by Alfred H. Brooks in an article* published in the *Bulletin* of the American Geographical Society.

The maps of Alaska published by the United States Geological Survey are divided for convenience of designation into three general

* The Investigation of Alaska's Mineral Wealth: Vol. XXXVII, No. 1, Jan. 1905, pp. 26–40.

types: exploratory maps (1:625,000, or nearly ten miles to an inch, contour interval 200 feet); reconnaissance (1:250,000, or about 4 miles to an inch, contour interval 200 feet); detailed maps (1:62,500, or a little less than one mile to an inch, contour interval 25, 50, or 100 feet according to the relief). The scale of publication is governed by the accuracy and the amount of detail with which the field work is executed. In exploratory surveys, modes of travel and methods of survey are adopted which permit of the maximum speed, since the object is to procure as much geographical data as possible, and exact geodetic position is subordinated to the collection of these data. Such surveys are usually route traverses in which directions are generally obtained by use of the magnetic needle and in most instances distances are measured by stadia or micrometer measurements. Sometimes, where the transportation is by canoe the speed of the boat down stream is estimated or the distance is paced along the bank of the river. In most cases plane tables are used upon which the traverse is platted in the field and the adjacent topography delineated. Frequent astronomical observations for latitudes and azimuth are made by means of which the geodetic position of the surveys is determined.

Reconnaissance maps are executed in greater detail than exploratory maps and are results of areal rather than route surveys. Regular plane table methods are employed, supplemented by locating control points by the more exact method of instrumental triangulation. In many instances observations for latitude and azimuth are made by the topographer who is doing the mapping. In such cases the longitudes of the surveys are obtained by connections with previously located areas. These connections are often unsatisfactory, but it is considered that the accuracy is much greater than it would be possible to obtain by time observations and comparisons under the existing conditions. Along the southern coast the geodetic control of the Coast and Geodetic Survey is so well extended that many of the surveys have been connected directly with it.

Detailed maps of certain small areas of special economic importance are made on a larger scale and in greater detail and accuracy than is furnished by the reconnaissance maps. These surveys are executed by the same methods and with the same accuracy as similar surveys in the states and have proved of the utmost value in mining and water power developments. While these detailed surveys in themselves are accurate, the geodetic position as in the case of the reconnaissance surveys is often dependent upon astronomic determinations made by the topographer.

XUM

The first work of the Geological Survey was mainly of an exploratory nature along the principal rivers. By 1900, exploratory surveys had been executed of most of the principal waterways, thus forming a net work of partially connected surveys, while the intervening areas were large and practically unexplored.

The successive discoveries of rich gold placers in the Klondike in 1896, at Nome in 1898, and at Fairbanks in 1902, attracted thousands of gold seekers to the Territory and created a demand for more exact topographic information. Consequently, purely exploratory or route surveys gave way to reconnaissance or areal surveys. By 1906, practically the entire Seward Peninsula had been mapped, much of the Yukon-Tanana region, and a large area in the Copper River region. Previous to 1905, detailed surveys were inaugurated by mapping an area about Juneau, which is the largest lode gold producing district in the Territory. Demands for similar surveys in the Seward Peninsula were met by mapping an area of 490 square miles extending from Nome northward and another of 440 square miles from Solomon northward, covering the most important placer gold districts of the Peninsula.

The appropriation for the investigation of Alaska's mineral wealth, which was but $25,000 in 1899, was gradually increased to $90,000 in 1909, and $100,000 in 1910, thus making it possible to keep the work more nearly abreast of the mining developments; and the topographic mapping has progressed hand in hand with the geologic investigations. A few exploratory expeditions have been made, but in the main the work has been on the reconnaissance scale.

The Yukon gold fields were the first region where areal mapping was executed. As early as 1898 the Fortymile district was surveyed on the regular reconnaissance scale. The placer gold production of this region gradually increased from barely a thousand dollars in 1884 to over $10,000,000 in 1906, thus creating a demand for added surveys. While work in this region was not continued without interruption, it kept pace with mining development and, by the end of 1910, maps had been made of the entire area lying between the Yukon River on the north, the Alaska Range on the south, the 141st meridian on the east, and the Nenana and the Tanana rivers on the west, with the exception of a few thousand square miles west of the eastern boundary and south of the Tanana River. The area surveyed includes approximately 35,000 square miles, the largest area of contiguous surveys in the Territory. In 1907 a detailed topographic map was made of the Fairbanks district, within the Yukon-

Tanana region, with a view of making a thorough geologic study of the placer deposits and collecting information concerning the occurrence and distribution of placer gold. The area covers 450 square miles and is the richest gold placer district thus far discovered in the Territory.

All surveys in Alaska are of necessity expensive, because of the remoteness of the areas mapped and the shortness of the field season, and in the Yukon-Tanana region the expenses reach the maximum. The field season, which extends from about June 15 to approximately September 15, is governed by the time the Yukon River, which is the regular route, is open to navigation, and by the grass supply where pack horses are used. Fortunately, the dates of Yukon transportation and of available forage very nearly coincide. The average output of one topographic party during a season is approximately 3,000 square miles and the cost per square mile in this region averages about $2.50.

Reconnaisance surveys were commenced in the Copper River region in 1900 and in two years an area of 16,000 square miles was mapped. These earlier surveys, both topographic and geologic, have been of great value to the mining interests. In this particular region the maps of the Geological Survey proved most important as a basis upon which the study of available railroad routes was made by means of which the route followed by the present railroad up the Copper River Valley was selected.

In 1910 the Valdez Creek district was mapped on the reconnaissance scale by two topographic parties, resulting in the survey of an area of nearly 5,000 square miles. This district lies just south of the Alaska Range in approximately longitude 147° W. Valdez Creek, on which is the greatest amount of mining development, is a tributary of the Susitna River, near its head. As a producer of placer gold, attention was first drawn to this creek in 1903, but since other regions of apparently greater importance demanded the immediate attention of the Survey, this district was not surveyed until 1910. The maps of this area add much to the knowledge of the topography of the Alaska Range between longitudes 146° and 148°, and of the headwater region of the Susitna and the Gulkana rivers. Mount Hayes, the highest point in this region, was definitely located and its elevation found to be 13,940 feet. The maps show large glaciers, some of them over twenty miles long, which fill the valleys in the vicinity of Mount Hayes. The survey of the Valdez Creek district was of peculiar interest, because of its remoteness from steam transportation. The

supplies for the parties were sent to the locality by sled the previous winter at a cost of $700 per ton, and the members of the parties walked 190 miles before commencing work and 270 miles back to the steamer after having completed the season's work.

The area surveyed in the Valdez Creek region is contiguous to the previously mapped areas of the Copper River Basin to the southeast, and of the Yukon-Tanana region to the north, thus forming a belt of mapped area extending from the coast to the Yukon River.

The rapid industrial advances in the Copper River region have made detailed surveys imperative. The Nizina district, containing rich copper deposits of vast extent to which a very expensive railroad has been built, was naturally chosen as the logical area in which to study the copper deposits with a view to determining if possible the laws governing their occurrence. Accordingly, during the summer of 1908, a detailed topographic map covering an area of 325 square miles was made.

The Kuskokwim River was explored and mapped in 1898 by one of the first parties from the Geological Survey. But not until 1910 were further surveys executed in this part of Alaska. During that year a reconnaissance survey was made of the Innoko region, which lies south and east of the Yukon River in longitude about 156° W. and at the headwaters of Yukon and Kuskokwim drainage. This survey, which covered a region of approximately 3,200 square miles, furnished definite knowledge of an area much of which was almost unknown. While no features of remarkable interest were noted in this area, the headwaters and in some instances the entire courses of streams were definitely located. In addition to this areal mapping, a traverse was made of the Iditarod River from Iditarod City to its confluence with the Innoko River and down that stream to its mouth at Holy Cross on the Yukon. These rivers flow, for the most part, through a featureless plain nearly reduced to base level, and their sinuosity is very great. The traverses represent the courses of the streams at a minimum stage when they are confined within very low banks. During the spring high water, the rivers overflow their banks, flooding the plain for miles on either side and steamboats literally sail across country.

The Susitna valley on the west and the Matanuska valley on the east of the Talkeetna mountains, which lie just north of Cook Inlet, were regions of exploratory surveys during the early period of survey work in Alaska. Subsequent discoveries of valuable coal deposits in the Matanuska Valley drew attention to this region, and

XUM

in 1906 reconnaissance surveys were made of the Matanuska valley and of as much of the Talkeetna Mountains as was possible during the season. There still remains an unmapped and practically unknown area in the heart of the mountains. The area covered by the survey was about 7,200 square miles.

The coal fields in the Matanuska valley continued to attract attention and received cursory examination and during 1910 a detailed study of the larger part of this field was made. To facilitate the work of correlating the geologic data a detailed topographic map covering an area of 196 square miles was made the previous year.

The only survey which has been executed on the west side of Cook Inlet was made of the region about Lake Iliamna, the largest lake in the Territory. This reconnaissance survey, which commenced on Iliamna Bay on the west coast of Cook Inlet, extended across the rugged mountain range between the Inlet and the Iliamna Lake basin and also covered a large area about Lake Clark. In addition to mapping a large area of the adjacent country, the work yielded the first instrumental survey of Iliamna Lake, which is about 75 miles long and averages 15 miles wide, and Lake Clark which is 50 miles long and averages 3 miles wide. These lakes are less than 100 feet above sea level.

In addition to the reconnaissance surveys which have been mentioned a few additional areas have been mapped by geologists and others incidental to various investigations. Among these surveys was that of an area on the eastern side of the Alaska Range in the vicinity of Mount McKinley. While this map does not cover in detail the area in the immediate vicinity of the mountain, it shows the salient features and covers an area of economic interest and value from a mining standpoint. Earlier maps had been made of the west slope of the range with which the later maps combined to give much knowledge in the vicinity of the highest point on the North American continent.

In 1910 a geologic reconnaissance of the now famous Controller Bay district was made and in 1905 a detailed topographic survey was begun and completed in 1906. Although this map offered little of geographic importance, it has been of much value to the mining interests. The information given by these topographic and geologic surveys has been the basis of the active interest and development in the Controller Bay Coal Field.

In southeastern Alaska detailed surveys have been made of the Juneau gold belt, which extends from Douglas Island northward to

XUM

and including the Berners Bay district. These surveys cover the areas included within the Juneau district, Eagle River district, and Berners Bay district.

Surveys in Southeastern Alaska have been executed under extreme difficulties. Practically the entire region below an elevation of 2,500 feet is covered by a dense blanket of spruce, cedar, hemlock, brush, and other vegetation, of which the Devil's Club is the most annoying. The luxuriant vegetation and the fallen timber make these forests almost as impenetrable as a tropical jungle. These obstructions to travel and the almost continual rains make surveying in this region very difficult and expensive. The cost per square mile averages about $42.

Other areas in Southeastern Alaska in which mining developments have been sufficient to warrant detailed mapping are the copper districts on Prince of Wales Island. Detailed maps have been made of the Kasaan Peninsula district on the east side of the Island and the Copper Mountain district on the west coast.

In the foregoing an attempt has been made to indicate the geographic and topographic data acquired by the Geological Survey up to 1911. It may be of interest to outline in detail the work of one season, and, accordingly, the expeditions which were made during the past summer are described separately. The work of 1911 varied widely in locality and in scale. For the first time in several years there was an important exploratory expedition, during which a continuous topographic survey was executed. The party, consisting of P. S. Smith, geologist in charge, and C. E. Giffin, topographer, a station assistant, two boatmen, and a cook, proceeded by steamer up the Koyukuk River to the mouth of the Alatna River. Here they loaded their outfit and supplies into three Peterborough canoes and commenced their long journey to the headwaters of the Alatna. At Help-me-jack Creek, a tributary from the west, the topographic surveys of the season were commenced. They were a continuation of similar surveys which had been made in 1901 up the Alatna to this point, thence up the Help-me-jack and down the Kobuk to Kotzebue Sound. At the headwaters of the Alatna the Smith party found a pass 1,000 feet high leading to the headwaters of the Noatak River. Across this pass the supplies, equipment, and boats were portaged for twelve miles by the members of the party. This portage was a difficult task, since the supplies and camp equipment, exclusive of the boats, weighed 1,800 pounds and necessitated five trips for the members of the party. Four and one-half days were

XUM

consumed in packing the supplies over this pass. Once on the Noatak, the party drifted to its mouth at Kotzebue Sound. Throughout this distance of 650 miles a topographic survey was executed of a heretofore little known and entirely unmapped country covering an area of over 10,000 square miles.

A topographic party in charge of D. C. Witherspoon mapped an area of 1,900 square miles in the Hanagita Valley and Bremner River region. While this area was more accessible than the Noatak region, it was as little known, and the map resulted in authentic information concerning the course of the Bremner River and its tributaries.

Mr. Witherspoon's party consisted of himself, a station assistant, two packers, and a cook. Transportation was by a pack train of eight horses. Since in the region traversed there was no possibility of procuring supplies, rations for the entire season were carried, which necessitated many double trips during the earlier part of the season. Before visiting the Hanagita Valley country the same party made surveys along the face of the mountains from Cordova eastward to the Copper River, and the last month of the season was spent in extending a system of triangulation from an astronomic station at Copper Center southward to connect with a station in the Hanagita Valley country.

Another topographic party, consisting of five men and seven horses, of which the writer was in charge, landed at Homer, a small town on Kachemak Bay on the east side of Cook Inlet. Traveling also by pack train, their course lay eastward along the north shore of the bay and for 35 miles up the valley of Fox River, a stream entering the head of the bay from the east. From this point, which was near the western face of the main range, they turned to the north and followed the foot hills along the front of the range to Turnagain Arm. Topographic maps were made of an area covering about 3,760 square miles. These surveys practically complete the mapping of Kenai Peninsula. Up to last summer much of the topography of the interior of Kenai Peninsula south of Kenai Lake has been unknown and the hypothetical sketches of the area have been very erroneous. In the course of the surveys of this expedition it was proved conclusively that this great area of unknown country was covered by an immense ice cap, the tongues of which shoot out of every valley which connects with the main reservoir. This field is a wonderful sea of ice 70 miles long and twenty miles wide. Its surface, which is a dome, is here and there broken by the crests of moun-

XUM

tain islands some of which are over 6,000 feet above sea level. Many of the glaciers, of which there are thirty-six, extend down the valleys for more than ten miles. The crest of this immense reservoir of ice is over 4,500 feet above sea level, while some of the glaciers on the east and south coasts extend entirely to tide water. If the elevations of the valley floors which are covered by this field of ice can be judged by those of similar valleys in the northern part of the Peninsula, its thickness must be between 2,000 and 3,000 feet.

The addition of these new geographic data add much to the map of Alaska. A report on the glaciers of Prince William Sound and the Kenai Peninsula by U. S. Grant and D. F. Higgins based on surveys made in 1909 is now in course of publication.

Until within the past two years the interest of the Alaskan prospector centered chiefly in the search for placer gold, but during the past few months much interest has been manifested in search for lode deposits, with the result that a few valuable auriferous quartz veins have been located. The country about Valdez has proved an important field of search, and, accordingly, an area of 160 square miles was mapped on the scale of 1:62,500 by J. W. Bagley during the past season. The most interesting feature in this piece of work is the method by which the work was executed. The plane table was supplemented by the use of a panoramic camera. Although the photo-topographic method has been widely used, this is probably the first extensive application of a panoramic camera for this purpose. Mr. Bagley also constructed by the same method a similar map of a small area in the Moose Pass district on the Kenai Peninsula where extensive lode deposits have been located and a few hundred square miles of country in the northeastern part of the Peninsula on the reconnaissance scale.

A summary of the work of the Geological Survey to date shows the following:

| | SCALE. | SQUARE MILES. | PERCENTAGE OF TOTAL AREA OF ALASKA. |
|---|---|---|---|
| Exploratory surveys | (1:625,000) | 47,680 | 8.16 |
| Reconnaissance surveys | (1:250,000) | 114,045 | 19.45 |
| Detailed surveys | (1:62,500) | 3,022 | .52* |

During the fourteen years in which the surveys in the interior of Alaska have been executed under the Geological Survey, the geo-

* In addition to the above the International Boundary Survey and the Coast and Geodetic Survey have made surveys of parts of Alaska and the General Land Office has executed subdivisional surveys in four localities within the Territory.

XUM

graphic knowledge of the Territory has steadily increased, and although there are many large areas which have not been surveyed, the salient features have been mapped and much data are available concerning areas which have not been visited by members of the Survey.

The reconnaissance maps, which now cover an area of approximately 114,000 square miles, or nearly one-fifth of the Territory, are eagerly sought by prospectors and have proved most valuable to them. The detailed surveys have been executed with care and precision and have been of valuable assistance to mine operators and to engineers as a basis for engineering work. The Alaskan topographic maps are usually first used as illustrations accompanying the geologic reports which are for free distribution. Sale editions of the detailed maps are made as soon as the reports in which they are first published are exhausted. The usual price is five or ten cents to cover cost of publication.

With a view to completing eventually a series of maps on the scale of 1:250,000 covering the entire Territory, a plan has been inaugurated for issuing the maps in sheets covering quadrangles of the earth's surface two degrees north and south and four degrees east and west. These maps, which are 32 by 36 inches, covering an area of approximately 16,400 square miles, are sold for twenty-five cents. Five of these maps have already been published.

The general policy of the Survey in Alaska is to keep pace with the demands for authentic information so far as the appropriations will allow. This demand is met not only by publication of new maps but also by occasional revised editions of maps previously printed.

With improved transportation facilities and better organization of the work, the results are each year becoming more satisfactory. The demand for maps and other publications of the Survey and the hearty cooperation of prospectors, mine operators, business men, and corporations are an evidence of the popularity and value of the work of the Survey in Alaska.

XUM

# A GEOGRAPHIC STUDY OF DULUTH*

BY

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*The Harbor and Water Transportation.* The Duluth harbor (Fig. 16), as stated above, is formed by the union of the tapering southwestern extremities of Lake Superior with the mouth of the St. Louis River. Two long sand spits have formed across the bay, one extending for a distance of seven miles from the Minnesota shore at right angles to Duluth and the other a distance of three miles from the Wisconsin shore parallel to Superior. The natural entrance to the Duluth-Superior harbor, therefore, is located seven miles from Duluth. The pioneers of this vicinity were not slow to observe the disadvantage of that distance and to see the possibility of making a gateway immediately in front of Duluth. Little time was lost in proceeding with the construction of a ship canal across the spit (Fig. 16), which at once stimulated activities in Duluth.

Navigation between the Lake Superior and the lower lake ports during the season of 1910 covered a period of 245 days, but "the open season for Duluth-Superior harbor, to and from Lake Superior ports only, was much longer, as navigation was closed to the local boats only a few weeks during the year."†

The long sand spit, Minnesota Point, now a sand bar since the building of the ship canal, is one of the primary causes for Duluth's almost unexcelled harbor. It is perfect protection against storm waves, and therefore makes the handling of the commerce in the harbor absolutely easy. Because of the excellence of this harbor and that of other harbors on the great lakes with which commerce is carried on, the boats carrying cargoes of coal, iron ore and wheat have been enlarged, until to-day 500-foot freighters drawing eighteen to twenty feet are common and boats over 600 feet in length not unusual. While the harbor is dredged to a depth of twenty-two to twenty-six feet, if necessary it could be dredged to a depth per-

*Concluded from *Bulletin*, June, 1912, pp. 401–417.
† "Marine Commerce, Duluth-Superior, 1910." G. D. Fitch, Lieut.-Col. U. S. Engineers, Duluth.



XUM

mitting it to accommodate the world's largest boats, which draw 30 to 36 feet of water. These boats that approach close to a thousand feet in length could turn around easily in the spacious harbor; they could also anchor without difficulty, as the sandy bottom facilitates firm anchorage.

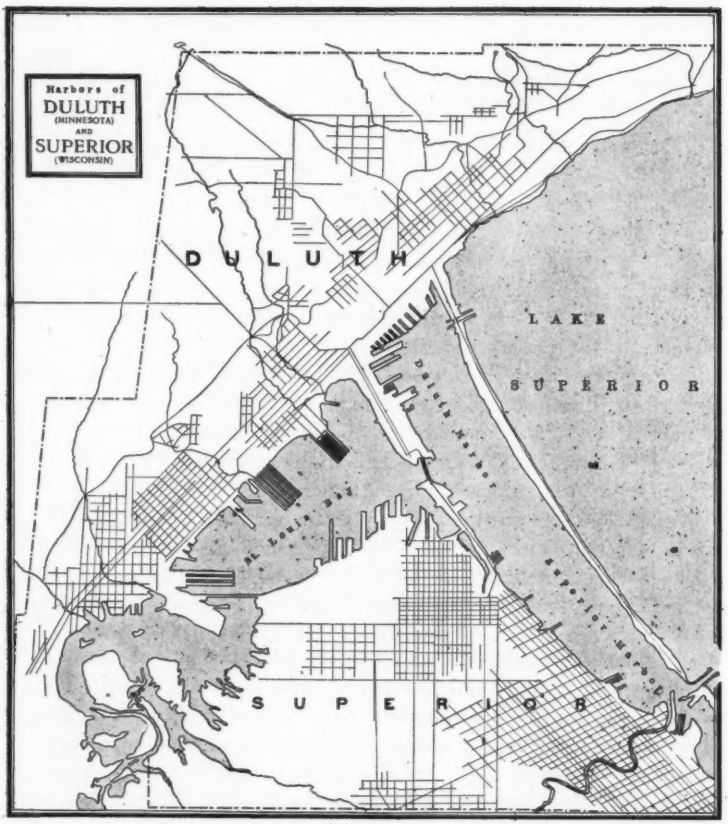


FIG. 16.

The ideal conditions for the best harbor may be stated to be: Easy approach; protection from heavy waves; deep channel; spaciousness; bottom for firm anchorage; a minimum of silting; absence of strong currents; easy communication with the hinterland. Every one of these conditions may be found in Duluth harbor, with

the possible exception of the last one, which, however, is true in a modified form. The approach from the east, south and southwest is easy, but from the west, northwest and north somewhat more difficult because of the presence of the range referred to above under Topography. This obstacle, however, is fast being overcome by tunneling and grading, so that it will soon be a negligible quantity.

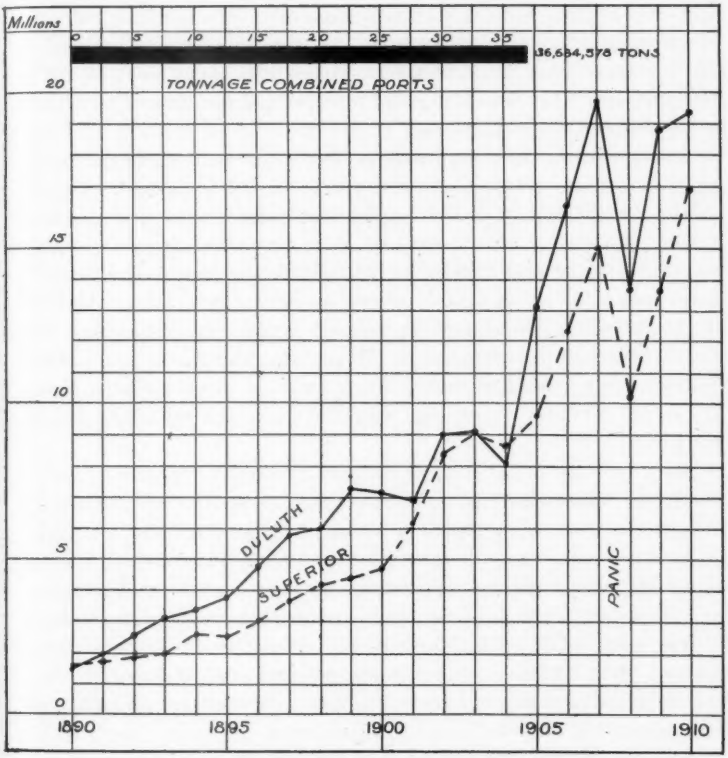


FIG. 17—Vessel freight received and shipped, Duluth and Superior.

The spaciousness of the harbor, combined with the jutting peninsulas that afford a long shore line and therefore large dockage possibilities, is of consequence. The length of docks influences the length of boats which will put into a harbor, and also influences very materially the cost of unloading and loading a boat. Duluth's harbor, as well as that of Superior, permits of the construction of docks

of greatest length necessary, as well as of the kind necessary to accommodate any sort of boats at a minimum cost.

"Combining Duluth and Superior, the area accessible to railroads now existing as wharfage is 664 acres, and area available is 4,069 acres. The net total number of acres, including the present wharf and possible wharves, allowing for certain space necessary for slips, is 4,733 acres. The entire harbor space, including Minnesota Point and Big Island, which are now inaccessible to railroads, includes eleven square miles, or 7,040 acres. At present, but one-seventh of the available space is occupied by wharves in operation and under construction. The lineal quayage, excepting the distances measured along slips, is forty-nine miles."*

These figures show impressively the tremendous capacity of the harbor, and the almost unlimited space for the expansion of commerce. A comparison of this harbor with a few of the world's great harbors is striking.

At Liverpool and Birkenhead, England, the basin occupies 583 acres and a lineal quayage of thirty-six miles, 255 yards. At Rotterdam, Holland, the harbor covers an area of 460 acres and has twenty-three miles of quayage. Hamburg, Germany, has a total water area of 1,282 acres and a lineal quayage of over fifteen miles. It has "in addition twenty-one miles of riverside and canal accommodations for river craft."†

Such unusual facilities have resulted in the development of water traffic, as shown in Fig. 17. Excepting in 1904, the total vessel freight received and shipped at Duluth has exceeded that of Superior. The total tonnage for both ports in 1910 was 36,684,578 short tons. In general, the commerce has been upon a very rapid increase, except for the notable year of 1908, when the financial panic bore its influence. The striking recovery immediately after the panic is partly a result of the nature of the products making up the commerce of the harbor, and partly due to excellent storage and dockage facilities of the harbor.

The Sault Ste. Marie Canal, at the eastern extremity of Lake Superior, has the largest tonnage among all the world's canals. Fig. 18 shows what that tonnage has been for the years 1901 to 1910 inclusive, having reached nearly 50,000,000 in 1910. This is the vessel tonnage which, of course, includes a large variety of commod-

* For Duluth the area of existing wharves accessible to railroads is 305 acres and the area available for additional wharves is 1,790 acres. "Report upon the Improvement of Rivers and Harbors in the Duluth, Minn., District." G. D. Fitch, Lieut.-Col. in charge.

† J. Paul Goode, "Development of Commercial Ports." Report of Chicago Harbor Commission, 1908.

ities. The freight tonnage of Duluth during the past five years has averaged about 38 per cent. of the total vessel tonnage passing through Sault Ste. Marie. The net iron ore tonnage for Duluth for the same period has averaged about 75 per cent. of Duluth's total freight tonnage. Comparing the fluctuations in the total output of iron ore with variations in Duluth's total net freight tonnage, and with the vessel freight tonnage of Sault Ste. Marie, the very close relation of the tonnage through the canal and the commerce of Duluth's harbor is readily seen. This is one of many illustrations which may be cited to demonstrate the fact that the Duluth harbor influences the tonnage in the great lakes region more than any other harbor. In fact, no other harbor on the lakes has a tonnage equal to that of Duluth, nor has equal facilities for handling a tonnage as large.

It is impractical to compare the tonnage of the Duluth harbor directly with that of ocean ports, because record of domestic tonnage is not kept at the custom houses, and hence a comparison of the records of the custom houses on the lakes and on the ocean would be faulty. However, comparing the average monthly tonnage movement for the eight months' season of navigation of the Duluth-Superior harbor with the average for other American ports, Duluth ranks probably next to New York.*

## Local Geographic Conditions

*Handicaps.* If two places offer practically equivalent opportunities, and it is left for a group of people to choose between them, that place which makes the stronger appeal, either esthetically or materially, will be chosen. Duluth certainly might have appealed to the esthetic sense years ago, when Superior was first founded, just as it does to-day. But Superior was a progressive town years before Duluth started. It is true that the slope of the range offers magnificent sites for residences. The view over the harbor is inspiring, and undoubtedly when the forests still occupied much of the surface was much more so than to-day. The question, then, as to why Duluth, with a later start than Superior, should have grown to a city nearly twice its size cannot be answered directly on the basis of a more beautiful location for homes. The site of Duluth is by no means as practical for a city as that of Superior, because building is difficult and expensive, due to the haul of materials up steep grades; because foundations for the most part must be blasted in rock; because street

* Marine Commerce, Duluth-Superior, 1910. G. D. Fitch, Lieut.-Col. U. S. Engineers, Duluth.

cars consume a very much greater amount of electric power climbing hills than when running on level ground; and because the wear and tear on them, as well as on all vehicles, is at a maximum. The cost of distribution of commodities is necessarily high because of the hills to climb. Loads must be light and hence small.

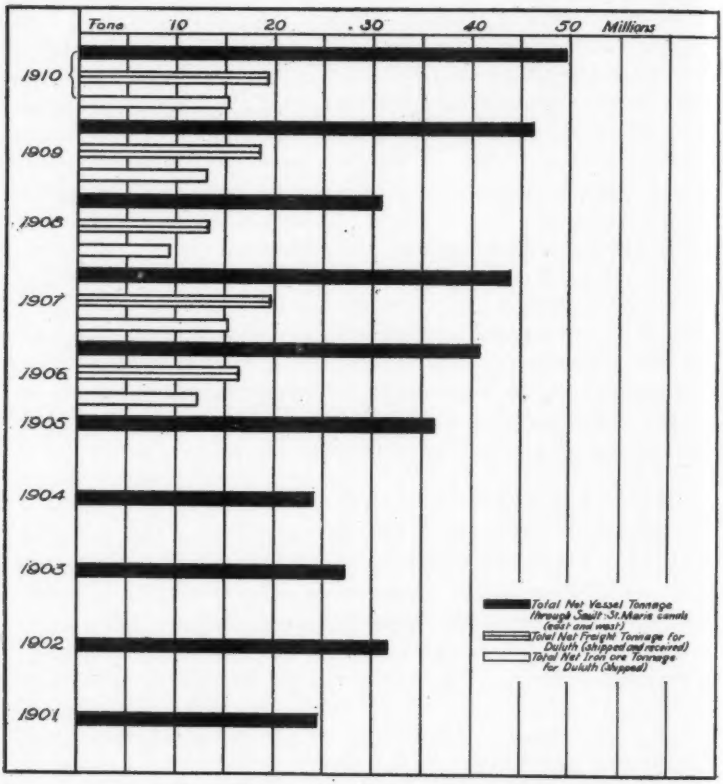


FIG. 18—Tonnage through Sault Ste. Marie Canals.
References: U. S. Statistical Abstract, 1910; Marine Commerce, Duluth, Superior; U. S. Eng. Office, 1906–1910.

The approach to Duluth by railroads from westerly and northwesterly directions is difficult. The area available for terminal yards is all too small; in fact, it will not accommodate present needs, and will undoubtedly remain a handicap until some double-decked or triple-decked system of railroad terminals is adopted.

*Advantages.* Then why, with all the above apparent disadvan-

XUM

tages, should Duluth have become the city that it is to-day, with 78,466 people, but with activities representing in general a city of 150,000, and in specific instances a city of 1,000,000?

Why is not the iron ore carried to the Superior side, where the land is flat? Because it is located at Duluth's back door; Duluth is located at the nearest, best accessible point to the lake. Because it is much easier and far less expensive to bring the boats seven miles nearer Duluth, and to let them carry the load back over those seven miles again and on to Sault Ste. Marie and the lower lakes, than to let the railroads carry the ore seven miles across bridges and viaducts to Superior. If it were cheaper to carry the ore to the flat land across the bay, where railroad terminal facilities are much better in many respects, the ore would be carried there. If a method should be found whereby it will be cheaper to take the ore across the bay and load it on boats there, that will be done. Large quantities of ore are shipped to Superior docks now as the result of improved railroad facilities and competition among railroads. However, up to the present time the difference in distance has been a most potent factor in determining Duluth's supremacy over Superior as an iron ore shipping point.

A secondary observation is worth noting, namely, that the ore boats on their return from the lower lakes bring coal. This coal they may dock at the nearest docking point, which is Superior. Hence, they may enter the natural channel at Superior, unload their coal, cross the bay to the ore docks, load the ore and leave via the ship canal to return to the East.

Inasmuch as the ore business is most advantageously conducted from the Duluth shore, those controlling the business will certainly choose the more beautiful site for their residences; hence, Duluth becomes their home. Laboring men employed on the ore docks locate their residences near their work. The needs of these men, such as food, clothing, etc., must be supplied; therefore, stores of various kinds are established. Secondary industries arise. These, combined with incidental factors that center about and grow out, directly and indirectly, from a localized industry of tremendous proportions, develop a large community—another reason for the existence of Duluth.

A second important influencing factor in Duluth's situation may be advanced at least as theory, if not fact. Throughout the history of the world the boats of all explorers have penetrated inland as far as the waters ahead would carry them. Merchants on the seas

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have always traded with points as far inland as their boats would take them. Almost without exception, the farthest easily accessible inland point has become the terminus of water transportation, with the other points en route as way-stations. In the United States a few examples may be cited: Providence, R. I., at the head of Narragansett Bay; Philadelphia, Pa., on the Delaware River, well above the head of the bay; Baltimore, Md., close to the head of Chesapeake Bay; Mobile, Ala., at the head of Mobile Bay; and New Orleans, La., at the head of tide-water 100 miles up the Mississippi River.

In Canada, Quebec had been for centuries the head of navigation on the St. Lawrence River; but recently the improvements in the river, making it possible for ocean boats to reach Montreal, farther up the river, made it the head of navigation and Quebec a way-station. Manchester, England, located 36 miles from the head of the estuary of the Mersey River, has been an inland city, with Liverpool as the seaport. Manchester constructed a canal, so that boats may now pass Liverpool, go up the canal and trade directly with Manchester. A complete change has not come as yet, but Liverpool's commerce has been affected; its rates on commodities have been lowered. It is very probable that so far as freight is concerned Manchester may be the head of navigation just as soon as the prestige and tradition of Liverpool's centuries of trade are broken.

So in the case of Duluth, though but seven miles from Superior, it is the farthest inland point and accordingly boats are destined for it as the terminus, and not for Superior. So long as Duluth continues to maintain its harbor facilities and remain the farthest inland point it will control the lion's share of commerce of the Duluth-Superior harbor. Duluth lies on the farther or western bank of the St. Louis River, and though but a short distance across is Superior, with an equally good dock frontage, the Duluth side has, by virtue of its geographic position, naturally developed much more rapidly.

*Population.* The population of Duluth is heterogeneous. Among the various types of peoples, the Scandinavians and Canadians are found in largest numbers. Of those people who are actively engaged in the control of the business and public affairs of the city, essentially all are still of the original generation of settlers. The city is not yet old enough for the second generation to take the leading part in its movements. Of the first generation, essentially all are either foreign-born or natives of the Eastern and Central States.

With a mixture of a wide variety of peoples, a complex mass of

ideas necessarily accumulates. Adjustment of different peoples to the same natural environments is in process. Such adjustments may be completed upon a compromise or balance of different ideas, conservative, progressive and retrogressive. The result of this fusion of thought in a community of generally strong, vigorous, energetic peoples is almost certain to be in favor of progress. In the case of Duluth, just that progressive spirit has resulted. The preponderance of a type of people, namely, the Scandinavians, who are accustomed in their home country to the rigors of this northerly clime, makes for

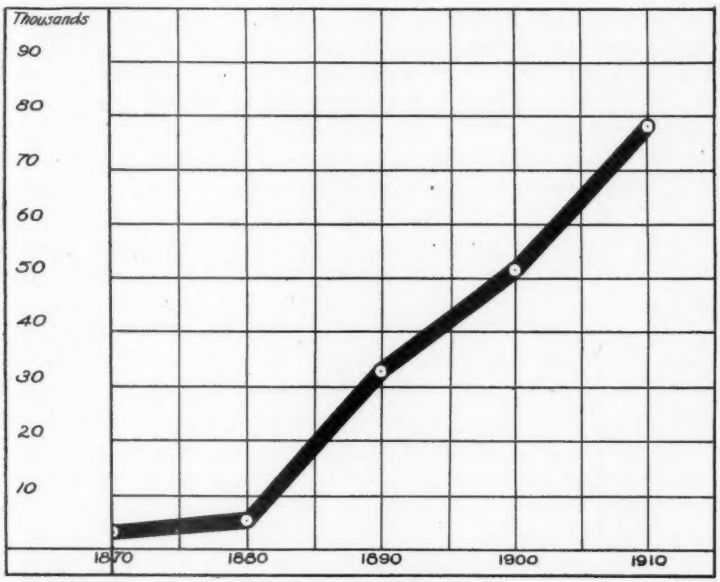


FIG. 19—Increase of Population. Duluth, 1870-1910.—U. S. Census.

a population that does not easily succumb to hardships, but rather overcomes them.

The rapid growth of the city is shown strikingly in Fig. 19, the absolute increase in population, and Fig. 20, the per cent. of increase in population. Duluth has held to the pace set by the world's largest port cities and has passed the State of Minnesota. For the decade of 1900-1910 the per cent. of increase was larger than that of either the State, London, New York or Chicago.

The distribution of population within the city is interesting. The

industrial establishments are located along that part of the harbor which borders the southwest end (called West End) of the city. The northeast end (called East End) is located beyond the harbor, along the shore of the broad expanse of lake. The laboring class lives near its place of business; the wealthier class as a whole lives at a distance from its place of business. This does not imply a dif-

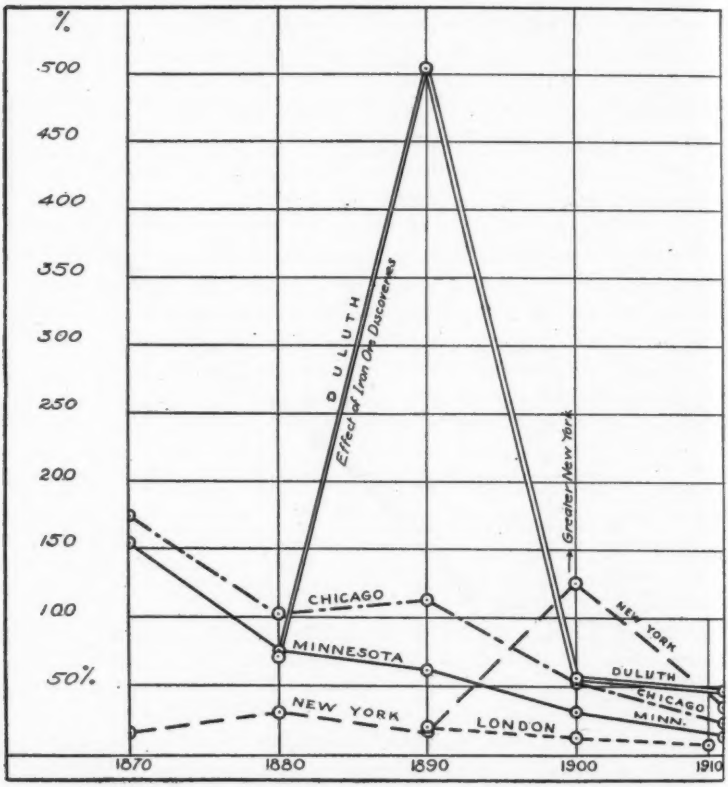


FIG. 20—Comparison of per cent. of increase in population for port cities and Minnesota. Note that Duluth's rate of increase has kept pace with other leading ports and its own state.

ference in the quality of citizenship, but illustrates, in part at least, the principle of the effect of the localization of industries upon the localization of types and kinds of people. The East End is an almost exclusive residence district, whereas the West End is peopled by a mixed or middle class of people.

*Permanence of Duluth.* The permanence of any city is dependent upon the available food supply. Mineral resources are exhaustible and therefore will buy food only for a limited period. Mineral resources alone do not invite a large population; they must be accompanied by food to support the people who market them. Duluth has a mineral resource of highest value, but at present it is unaccompanied by extensive food supplies. Foodstuffs must be brought from miles around. This means that freight charges are added to the selling prices, for which the consumer must pay. It is universally true that the mass of the people who can earn a living in almost any locality will choose that place where the cost of living is lowest. Food and clothing constitute the largest expense of the average individual. Therefore, despite the valuable resources and the bright prospects for much work ahead, working men are not attracted if food and clothing are high-priced. In Duluth the iron ore, coal, grain and lumber products which are shipped to the city for distribution afford much work for many men. General merchandise stores, established to support this working class, in turn demand clerical help. But the number of people willing to come to this city for such work, as well as for other occupations, is limited owing to Duluth's lack of a home food supply. The food cost is high; the cost of clothing is likewise high.

Duluth's hinterland, that supplies the iron ore, the prime factor in the city's present stability and past growth, will soon be without ore. The citizens of this generation need to provide for those of one or two generations ahead. What is the prospect? Money is necessary for the purchase of food. With the waning suppies of iron ore, less money becomes available for the buying of food. This must result necessarily in a very great increase in the price of food, if not altogether in a scarcity of food. Under such conditions the city seems doomed. This is not mere theory. Cities in the history of the world have risen to great prominence; have built wonderful edifices; have reigned supreme, only later to fall into decay. There may be skyscrapers built; there may be unexcelled steel structures erected; but if the food is prohibitive because of its cost to the citizens, those signs of progress, it seems, must come to an end. Thriving cities not far distant from Duluth, located in iron ore districts, have risen during the past twenty-five years, but now, because their sole resource is disappearing and agriculture is impossible, they are decaying rapidly.

What, then, are the future possibilities of Duluth? The shipping

facilities are unexcelled for trade in all directions. With the opening of the Georgian Bay canal by the Canadian government (Fig. 1) boats will come direct from Europe to Duluth. They may transfer their cargo here for Western ports, whence they may be shipped across the Pacific Ocean to the Orient.

The total distance by boat to Liverpool, via this canal and the St. Lawrence River and Atlantic Ocean, will be 4,208 statute miles.* The distance to-day from New York to Liverpool is 3,571 miles, only 637 miles nearer. The total distance between Duluth and Liverpool, via lake and New York Central Railway from Buffalo to New York, is 4,996 miles, or 788 miles farther than via the proposed new route. The new route will permit a much more rapid and less expensive transit between Europe, the East and the West. Chicago will no longer be the sole distributing center for the western country but will have to share its trade with Duluth.

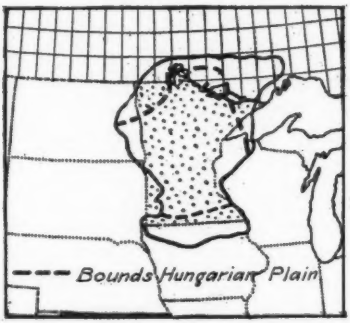


FIG. 21—Hungary superposed on Minnesota and oriented so as to bring the plains area coincident with the plains of Minnesota.

*Agricultural Possibilities.* An effort is made in the above discussion to show that Duluth has favorable climatic conditions for man. It can be demonstrated that it possesses a climate favorable to the cultivation of truck garden products, favorable to the dairying industry, and even to the production of wheat on a large scale. At present, farmers are actually gaining very successful returns from local production. What might be done in Duluth's hinterland and the State as a whole is best illustrated by a comparison of Minnesota with Hungary (Fig. 21). Hungary has an area of 109,007 square miles, compared with Minnesota's 87,000 square miles. In 1900 it had a population equal to 19,254,559. In 1910 Minnesota had a population equal to 2,075,708. Of the total population in Hungary, 6,055,390 were engaged in agriculture and 13,175,083 were supported by it. Hungary's iron ore resource is very small compared with Minnesota's. The country is agricultural throughout. In Fig. 21 Hungary has been oriented so that the agricultural area, namely, the Valley of the Danube, indicated by the broken line, coincides

* "Georgian Bay Ship Canal Survey." Department of Public Works, Ottawa, Canada.

almost exactly with agricultural Minnesota. Wheat is the principal crop of Hungary. Wheat is the principal crop of Minnesota. Hungary raises a variety of other crops, thus enabling it to supply all of its people with a variety of food at low cost. In fact, it goes so far as to levy a tariff upon most imported foodstuffs. Minnesota can grow a variety of crops also.

The latitude of the Danube Valley, or Hungarian plain, is essentially the same as that of Minnesota extending from about 45°N. to 49°N. The country is sufficiently far from the seas to possess a climate largely continental in character—not unlike that of Minnesota. If Hungary is capable of producing results such as mentioned, the possibilities in Minnesota, which possesses perhaps a far greater progressive spirit, seem almost unlimited. Surely a population many times the present can be supported at a low cost; Duluth need not be at any time subject to the catastrophe of decay even after the last pound of iron ore is shipped. If the citizens develop their agricultural hinterland, they may continue to bend their energies fearlessly toward the upbuilding of a great distributing center; they may safely proceed to develop the city as a manufacturing metropolis. Although there is no coal, there are 80,000 potential horse-power in the falls of the St. Louis River; 45,000 horse-power are now available, and nearly all in use.

The permanence of Duluth lies not in its iron ore resource but in its ability to secure a permanent food supply. That assured, all its other exceptional facilities may be developed without limit and a city of millions may grow.

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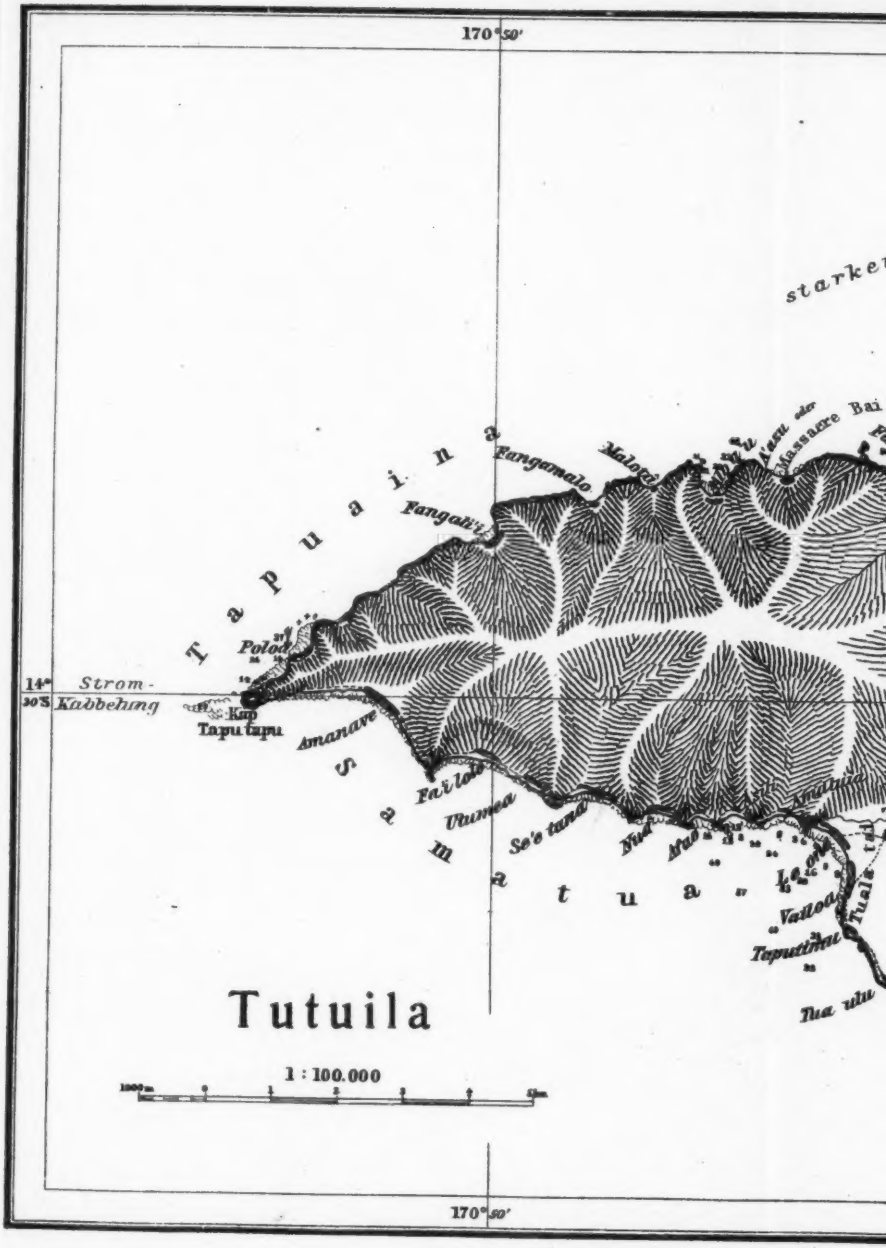
## A NEW MAP OF THE AMERICAN SAMOAN ISLANDS

In the April, 1912, number of *Petermanns Mitteilungen* a new map was published of Tutuila and of the Manua group of the Samoan Islands which embodies the results of original surveys made in December, 1910, by Dr. Kurt Wegener of the German seismological observatory at Apia. In view of the fact that these islands belong to the United States and that Dr. Wegener's delineation of them differs considerably from that on the relevant charts published by the Hydrographic Office, the map from *Petermanns Mitteilungen* (in two sections: one showing Tutuila and the other the Manua group) is reproduced herewith. The publication of this map seems all the more timely as, according to recent correspondence with the bureaus concerned, the U. S. Coast and Geodetic Survey, under whose jurisdiction would fall the survey of the coasts of these islands since their cession to the United States in 1900, is not contemplating a survey of the islands at present owing to other claims on its time, and the U. S. Hydrographic Office, under whose auspices the only extant official American maps of the islands or of parts of them are published, is likewise contemplating no extensive resurvey in the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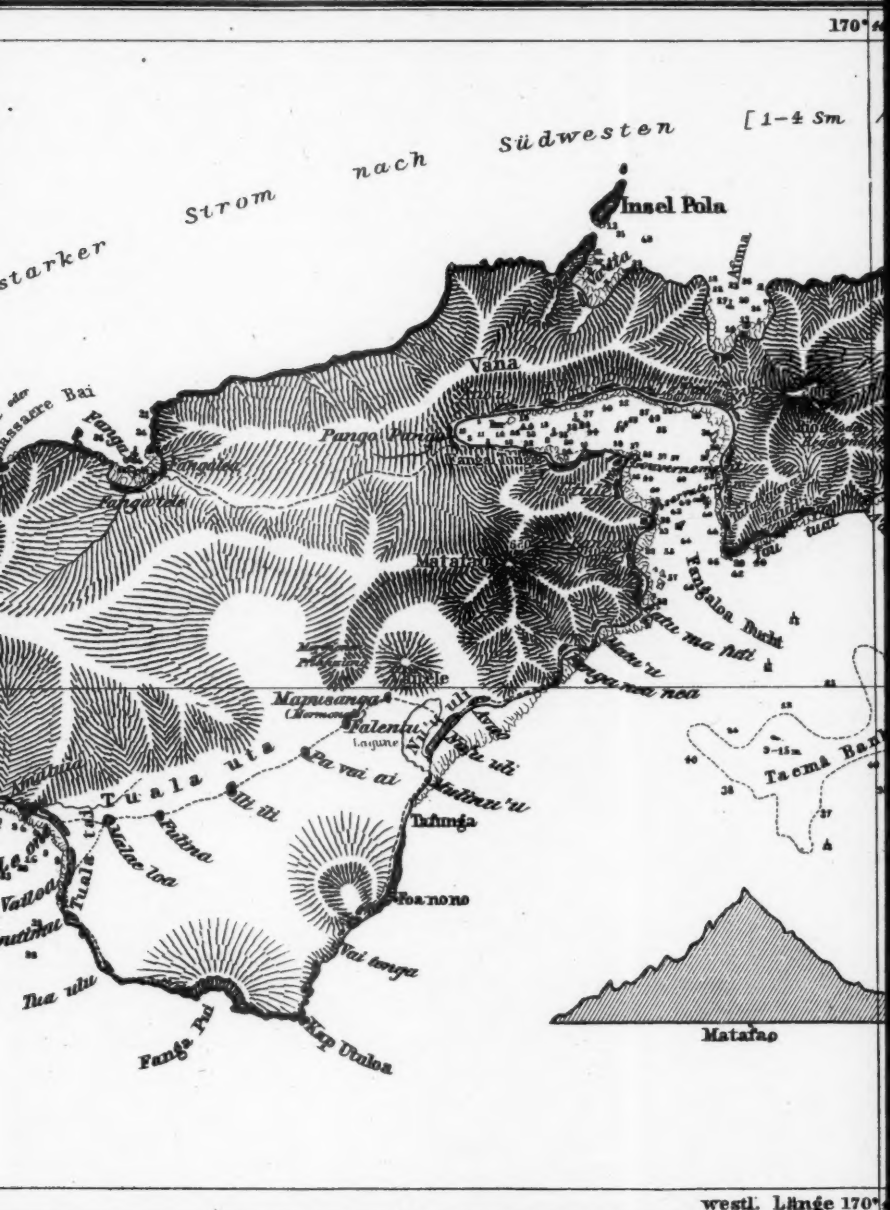


MAP OF TUTUILA, SAMOAN ISLANDS, FROM SURVEYS BY DR. KU

Reproduced from Pl. 40, Vol. 58, I, 1912, of Petermanns Mitteilungen

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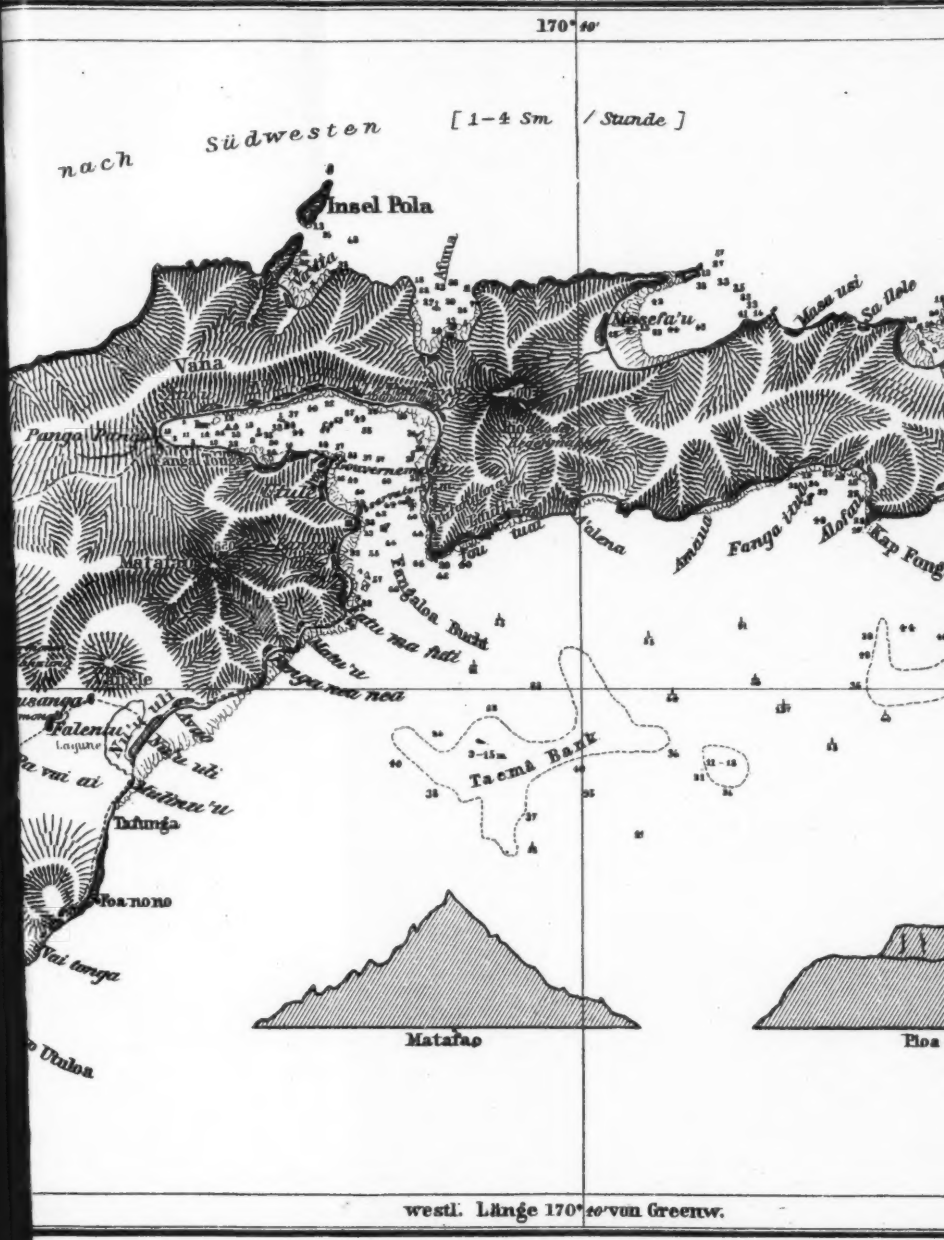


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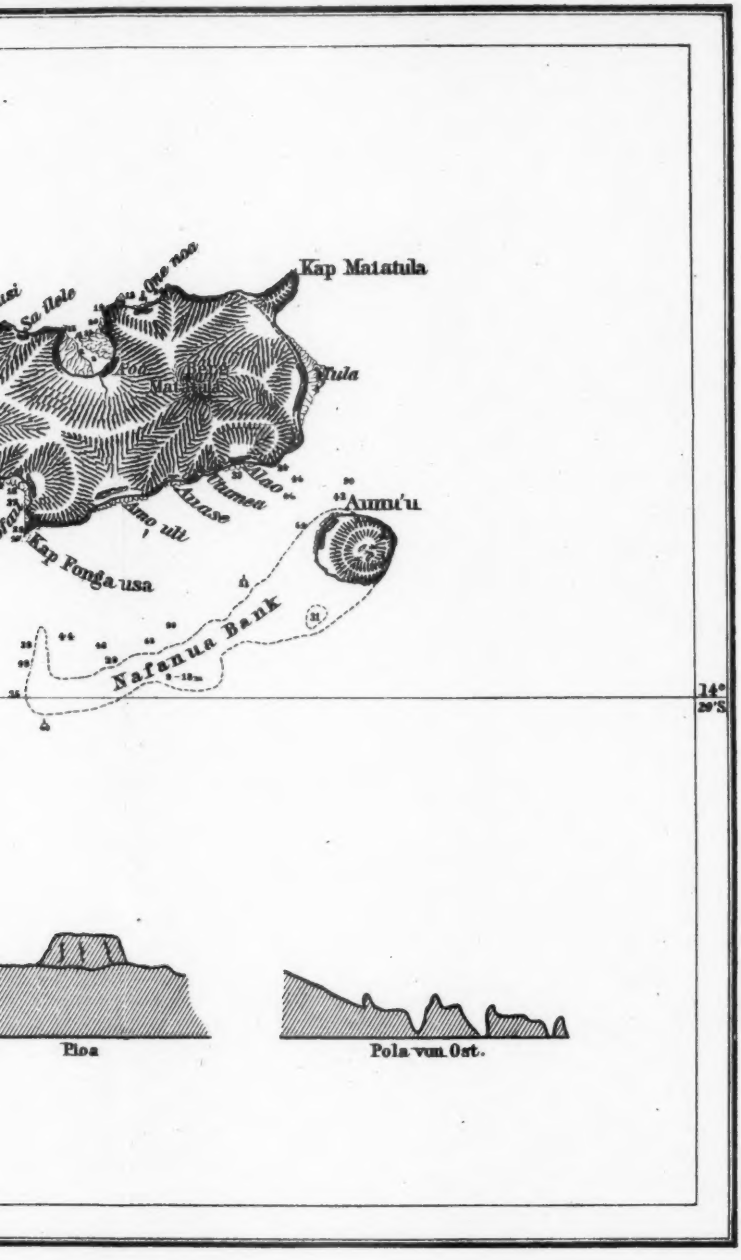
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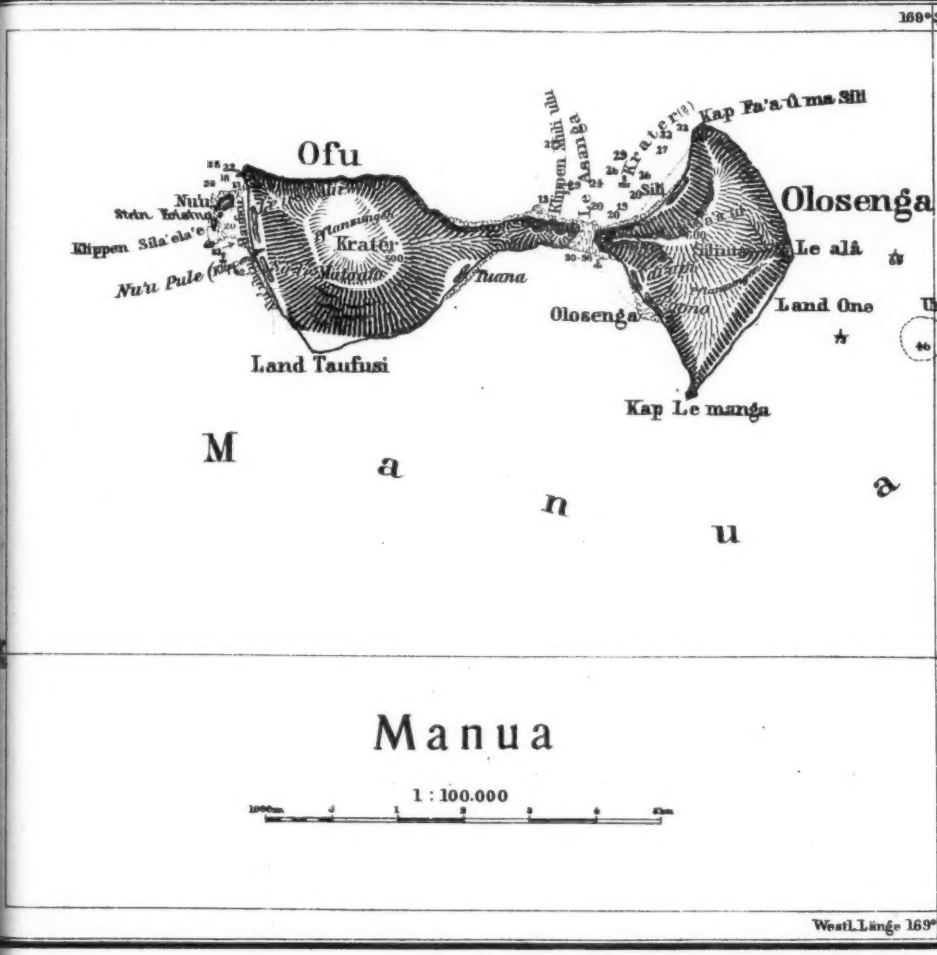


MAP OF THE MANUA GROUP OF THE SAMOAN ISLAN

Reproduced from Pl. 40, Vol. 58, I, 1912, of

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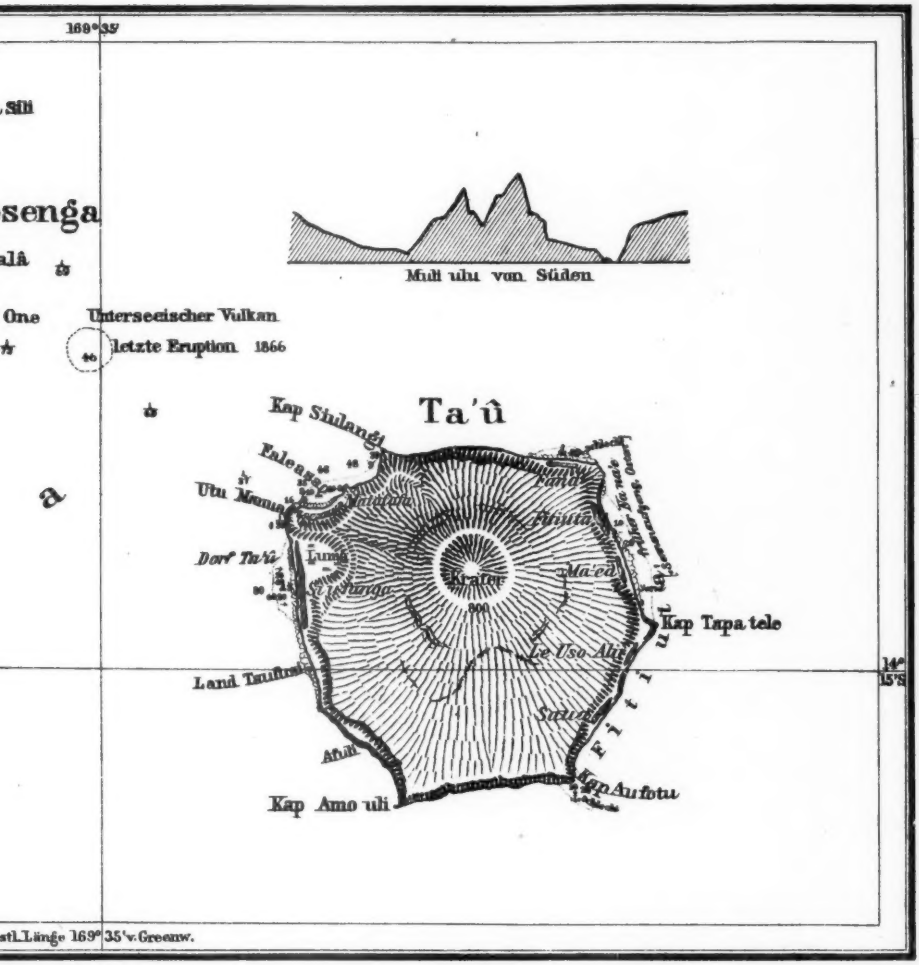


ISLANDS FROM SURVEYS BY DR. KURT WEGENER

I, 1912, OF PETERMANNS MITTEILUNGEN

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near future, although minor surveying operations may be undertaken from time to time.

The official maps referred to are the general map of Tutuila and of the Manua group on the mean meridional scale of 1:145,000 (U. S. Hydrographic Office Chart No. 90), which goes back to the surveys made in 1839 by the U. S. Exploring Expedition under Commander Wilkes, and Charts Nos. 92, 93, 2563 and 2637 of the same office. Charts Nos. 92 and 93 consist of inset maps of bays and of other details of navigational interest and are based in part on the work of the Wilkes Expedition and in part on later American and British surveys. These later surveys have, as a rule, not been incorporated on the general map of the island; reference is made, however, at the corresponding places to the proper inset maps. Chart No. 2563, on the scale of 1:8,400, is a detailed map of Pago Pago Harbor based on recent surveys by officers of the U. S. Navy between 1901 and 1910. Chart No. 2637, which supersedes former Chart No. 229, is a map of Leone Bay, on the southwestern coast of Tutuila, on the scale of 1:9,200, based on a survey by the U. S. S. *Annapolis* in 1909.

A comparison of Dr. Wegener's map with the general map of the islands published by the Hydrographic Office at first glance reveals a noticeable discrepancy in the representation of the size of the individual islands. While the former map is on the scale of 1:100,000 and the latter on that of 1:145,000, Tau (or Manua) Island, for instance, is of about the same absolute size, irrespective of scale, on both maps. The difference in size, too, between Tau on the one hand and Ofu and Olosenga on the other, is much greater on the Hydrographic Office chart than on Dr. Wegener's map. In the note accompanying his map (*Pet. Mitt.*, Vol. 58, I, pp. 208-209) Dr. Wegener refers to the evident incorrectness of this ratio on present charts. The following table, based on approximate measurement by the method of squares (which should, of course, before final acceptance be verified by planimetric measurement), will elucidate these differences:

COMPARATIVE TABLE OF THE AREAS OF THE AMERICAN SAMOAN ISLANDS

| | U. S. HYDROGR. OFFICE Sq. miles | WEGENER Sq. miles |
|---|---|---|
| Tutuila | 49.2 | 50.5 |
| Aunuu | 0.4 | 0.4 |
| Ofu | 1.8 | 2.8 |
| Olosenga | 0.6 | 2.2 |
| Tau (Manua) | 19.1 | 8.6 |
| | 71.1 | 64.5 |

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While the area of Tutuila and of the small island of Aunuu will thus be seen to be practically the same on both maps, the two sources are not in accord with regard to the area of the remaining Samoan Islands belonging to the United States (the detached atoll Rose Island in 14°32′ S. and 168°11′ W. is here not considered). Ofu is about one and one-half times and Olosenga even three and one-half times as large on Dr. Wegener's map as on the Hydrographic Office chart, while Tau Island, on the contrary, is less than one half as large on the former as on the latter map. The area of our Samoan possessions (exclusive of Rose Island, whose area, not counting its barrier reef, is about 0.8 square miles)—a subject not without interest—would thus be reduced by Dr. Wegener's map from 71.1 square miles to 64.5 square miles. The corresponding areas as given in the *Statesman's Year-Book* for 1912 (p. 572) are about 54 square miles for Tutuila and about 25 square miles for Tau, Ofu and Olosenga together. The area of these three lesser islands is, respectively, 13.6 square miles according to Dr. Wegener's map and 21.5 square miles according to the Hydrographic Office chart.

Referring now to some of the more salient differences in the two delineations of the shape and of the topography of the islands, it may be said that Ofu and Olosenga on both maps are not only different in size but in shape also. Ofu is more compact in form on Dr. Wegener's map and less elongated than on the Hydrographic Office chart; Olosenga on the former is rhomboid in shape, while on the latter it is triangular. That the southern point of Olosenga should project farther south than it does on the Hydrographic Office chart is shown by the fact, to which Dr. Wegener calls attention in the note accompanying his map, that, from the interior of the cove enclosed by the southern sides of Ofu and Olosenga, Tau Island is not visible. Ofu Dr. Wegener describes as a well-preserved crater open to the northwest. The survey made by the Wilkes Expedition shows a straight ridge. Olosenga, Dr. Wegener goes on to say, is the remnant of a volcanic cone that collapsed or exploded. The semicircular cliff at whose foot lies the village of Sili probably represents the southeastern enclosing wall of the crater. The two jagged crags Muli ulu forming the eastern tip of Ofu may be a part of this wall or else may represent the ruins of a third crater lying to the north. Both the crater of Ofu and the outer slope of the crater of Olosenga are occupied by native plantations.

Tau Island is also a crater; it is the best preserved of the group. A spur (called Utu Manua on Dr. Wegener's map) is

represented as projecting from its northeastern corner on the Hydrographic Office chart. This is incorrect, says Dr. Wegener. A cove thus indicated south of it does not exist. This is the reason why the roadstead of the village of Tau is entirely unprotected against northerly winds. Dr. Wegener did not personally visit the southern, eastern or northern coasts of Tau Island. His map here is based on the statements of the local pilot Stephany.

Tutuila is described as being essentially a deeply dissected lava plateau. The ridges which have been carved out of this plateau are very differently represented on the two maps. On the Hydrographic Office chart they appear on the whole as isolated peaks capping a series of parallel ridges following the trend of the island, while on Dr. Wegener's map the interior relief of the island is represented rather as a single broad ridge from which subsidiary spurs project.

The greatest discrepancy between the two maps with regard to the topography of Tutuila relates to the island's southernmost prong. This is represented on Chart No. 90 as a mountainous district ending in a sharp point to the southwest: on Dr. Wegener's map it assumes the character of a flat foreland sheltering a line of villages on its inner side and bounded on its outer side by two craters, half of one of which is missing, so that a cross section of the crater may be seen from the sea. That the sharp point shown on Chart No. 90 is not the prominent projection it is there represented to be is evident from Chart No. 2637. On this recent chart (whose delineation has not yet been incorporated on Chart No. 90) this point (termed Leone Point, the equivalent of the point at Tua ulu on Dr. Wegener's map) is rather a subsidiary promontory lying at the junction of a N.N.W. and of an E.S.E. trending portion of the coast—if the gray color indicating land on Chart No. 2637 may so be interpreted with regard to this latter part of the coast-line, which was not included in the recent survey. This delineation, which, because of its large scale and its recent date, may be taken to be the most correct representation extant of this part of Tutuila, corroborates Dr. Wegener's survey. (Chart No. 2637, although based on a survey made in 1909, was not published until May, 1911. Dr. Wegener's survey was made, it will be remembered, in December, 1910.) The discrepant representation on the current edition of Chart No. 90 is taken from the survey of Leone Bay made in 1872 by Commander R. W. Meade of the U. S. S. *Narragansett,* formerly published as Chart No. 229. The probable inaccuracy in the representation of Leone Point may, in this case, be due to the greater inexactness often prevalent in the marginal regions of a survey.

XUM

Chart No. 2637 unfortunately gives no clue as to the configuration of the coast east of Leone Point. That here, too, there is urgent need of a resurvey is evidenced by the fact that on the current edition of Chart No. 90 this coast is stated to be reported to extend farther seaward; its supposed position is indicated on the chart by a line which emphasizes still more the southwestern projection of the foreland in general and of Leone Point in particular. The fallacy of this last representation may be assumed to be proved by the delineation on Chart No. 2637. That the entire foreland should likewise extend farther southwest also seems improbable. The implied southeastern trend of the coast line east of Leone Point on Chart No. 2637 bears this out. Furthermore, the statement that the foreland projects still farther southwest seems so improbable to Dr. Wegener that he cannot but interpret its reproduction on the German Admiralty Chart available to him as a typographic error. He thinks northeast must be meant. His map carries out this opinion. An additional indication of the improbability of a southwestern extension of the foreland is found in the original delineation of this region according to the survey of the Wilkes Expedition as given on editions of Chart No. 90 published prior to 1872. Here the foreland is more rounded in shape and, in this, resembles the representation on Dr. Wegener's map. The need of a resurvey of this region in particular is further evidenced by the fact that the southern promontory of the foreland bears two lights which, according to the current edition of Chart No. 90, are the guide lights for the approach to Tutuila from the west, specifically for reaching Pago Pago from Apia, the chief town of the Samoan Islands on the German island of Upolu. The uncertainty of the position of these lights (explicitly referred to on Chart No. 90) might well involve danger to navigation.

Several minor differences in the two maps may also be noted here. On Dr. Wegener's map Pola Island (termed Vatia Island on the Hydrographic Office chart) continues the northeast trend of the spur on the north shore of Tutuila, with which it is evidently allied; on Chart No. 90 this island has an exact north-south trend. This representation is repeated on the inset of Vatia Anchorage on Chart No. 92, which is based on a survey of 1900. Another difference concerns the representation of Aunuu Island. On Charts Nos. 90 and 93 Aunuu is roughly triangular in form with an apex directed northwest towards the mainland of Tutuila. Dr. Wegener represents the island as circular and describes it as a crater. Aunuu, too, is not without interest to navigators, as it bears a light illuminating

the eastern approach to Tutuila. Of the two altitudes alone given on Dr. Wegener's map one differs from that given on the Hydrographic Office chart. To Matafao Peak, guarding the entrance to Pago Pago Harbor on the west, Dr. Wegener assigns 650 meters (the '5' is shown in reflected image on his map), the exact equivalent of the 2,133 feet of Chart No. 2563. Dr. Wegener's figure for Peoa (Pioa) Peak, to the east of the harbor, is 500 meters (the '5' on the map has undergone the same fate as its companion), or 1,640 feet. Chart No. 2563 gives 1,719 feet. It may be noted that the corresponding figures on a chart of the approach to Pago Pago, which also goes back to a survey by the U. S. S. *Narragansett* (shown on Chart No. 93), are, respectively, for Matafao Peak, 2,353 feet, and for Peoa Peak, 1,470 feet.

In his delineation of the most important part of Tutuila, Pago Pago Harbor (on Dr. Wegener's map, Fangaloa Bucht), Dr. Wegener differs considerably from the new detailed survey of that harbor published in September, 1910, by the Hydrographic Office as Chart No. 2563, already referred to. This difference mainly concerns the delineation of the western shore of the entrance to the harbor, especially of the cove forming the approach to Fa(n)gaalu. On Dr. Wegener's map this shore is less indented than it should be—for that Chart No. 2563, because of its much larger scale, is the superior authority in this case, there can be no doubt. Another case of a noticeable discrepancy between Dr. Wegener's map and a recent and undoubtedly more correct survey is to be found in his delineation of the southern coast of the western end of Tutuila between Utumea and Leone. On Chart No. 2637 this coast-line is much more indented by reentrant coves than on Dr. Wegener's map; this is particularly the case with the cove at whose head lies the hamlet of Seetana (Seetuga on Chart No. 2637). The general trend of this coast, furthermore, on the Hydrographic Office chart is E.S.E., while on Dr. Wegener's map it is practically east.

It is to be regretted that the note accompanying Dr. Wegener's map, which, for the most part, deals with the worthy subject of establishing the proper rendering of native names, does not contain a more detailed explanation of the differences between his map and existing charts. It would then be possible to know whether Charts Nos. 2563 and 2637 were consulted—as it was in all probability possible to do, if not prior to the date of his survey, at least before the final compilation of his map, as the former chart was published in September, 1910, and the latter in May, 1911—and, if so, what the reasons for the differences were.

XUM

However, the differences between the relevant portions of Dr. Wegener's map and the evidently more correct delineations on the recent charts of the Hydrographic Office affect only a relatively small part of the area considered and, therefore, need not be taken as a criterion for an unfavorable judgment of the remainder of his work. These differences should rather, as has been the aim of the above lines, emphasize the urgent necessity of a thorough general resurvey of all the Samoan Islands belonging to the United States.

W. L. G. J.

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# INSTRUCTION IN GEOGRAPHICAL SURVEYING

BY

I. N. DRACOPOLI

With the exception of the Royal Geographical Society of London, there is perhaps no school or college in English speaking countries where a private person may obtain efficient tuition in geographical surveying. The ordinary land surveyor cannot give adequate instruction, for astronomical observations have no part in his line of work and his methods are cumbersome and unsuitable when applied to large areas. It was to supply this need that the Council of the Royal Geographical Society appointed an instructor, Mr. E. A. Reeves, in surveying and map-making and arranged a course of work, which, when mastered, enables an explorer to profit by all his opportunities and to make as accurate and complete a survey as his time and means allow. The following is an outline of the work required:

*Practical Astronomy.* (*a*) Latitude.—Observations with the sextant and theodolite, including the adjustments, and finding index and level error. Computation of latitude by meridian altitudes of sun and stars, by circum-meridional altitudes, by Polaris and double altitudes. (*b*) Longitude and Time.—Observations with sextant and theodolite, and computations for finding local time by sun and stars, and thence the longitude; equal altitudes of the sun and stars for finding error and rate of watch. Telegraphic determinations of difference of longitude. Longitude by occultations of stars by the moon, and the prediction of the circumstances of occultations; longi-

tude by meridian distances. The principle of longitude by moon culminating stars by eclipses of Jupiter's satellites and lunar distances; (*c*) Azimuths.—Azimuth by star and sun, theodolite and sextant observations. Error of compass from the observed bearing of the sun and the computed true bearing of the sun.

*Surveying.* Triangulating and traversing with theodolite with their adjustments. Measurement of base-line. Latitude and Azimuth Traverses. Geodetic Latitudes and Longitudes. Astronomical Base-line. Computing the position of distant points observed with theodolite from the ends of a base-line, and plotting the same on projected plane-table sheet. Plane-table surveying, including different methods of orienting the table, finding position and continuing survey from points previously fixed by triangulation. Tacheometer surveying and finding the value of divisions of micrometer. Route surveying with prismatic compass. Keeping the field-book. Levelling and computation of heights from observed vertical angles, allowing for curvature and refraction, from barometer and boiling-point observations. Contouring, drawing contour lines, and vertical sections from them. Principle of photographic surveying.

*Map Projections, Plotting and Map Drawing.* Construction of the more useful map-projections, including the investigation of their principles. Plotting surveys from field-books. Map drawing with special reference to the delineation of topographical features. Scales of maps, and the construction of diagonal and other scales.

The student, at his examination, is required to produce maps plotted and drawn by himself entirely from his own surveys in which he has used all the instruments mentioned above, and to show specimens of drawings of different topographical features. These maps are generally three in number, one on the scale of 1 : 125,000 of a piece of country half a degree square, with contour lines at intervals of 200 feet; one on the scale of 1 : 5,000 of some small range of hills, with contour lines at intervals of four feet; and one a large scale map of some section of a town. The candidate must show all his notes and his observations, and unless these maps are satisfactory he will not be allowed to present himself for the final and oral examination. At the latter, he is expected to answer questions asked by the committee on any of the subjects here mentioned. He is also required to produce at least one example of each of the astronomical observations referred to above, taken and computed by himself, and to draw the geometrical figure representing each case to show that he has an intelligent understanding of the subject. If desired, he will in the

XUM

presence of the committee take an observation and compute the result. The time devoted to each subject must vary according to the individual capacity of the student and other circumstances, but before presenting himself for examination he is kept at each subject until he understands it and has done the practical work required.

Courses in geology, botany, zoology, anthropological measurements, photography and meteorology, also give explorers careful training in these phases of field work. All lessons are given at sixty cents an hour.

The intending traveler may thus prepare himself thoroughly to profit by any opportunities he may meet at a very moderate cost. Many eminent explorers have been pupils of Mr. Reeves, among them, Mr. Shackleton, Mr. Boyd Alexander, famous for his journey from the Niger to the Nile, Mr. Douglas Carruthers, well known for his work in Asia and Arabia, and Major Fawcett, who has been exploring the region around the Heath River in South America. This effort by the Royal Geographical Society to help explorers has been most successful, judged by its results, and might with advantage be imitated by the geographical societies of other countries.

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## THE SWEDISH SOUTH POLAR EXPEDITION*

### A REVIEW

**This initial number of the scientific reports of the Swedish Antarctic Expedition, though it appears subsequently to the issue of a considerable number of parts devoted to specialized topics, furnishes the commander's general summary of geographical discoveries, combined with a report upon the morphology, glaciology, and regional geology. These subjects, though covered with some fullness, are yet regarded as summaries which are to be followed by more detailed studies.**

**Some knowledge of the wealth of scientific results which the Swedish expedition has furnished has already been acquired from the published popular narrative of the expedition (already in several languages), from Nordenskiöld's "Die Polarwelt," as well as from numerous papers which the commander has published in scientific journals.**

**After a condensed narrative of the expedition, there follows a critical résumé of earlier expeditions into the same region. The "Morrell Land" which was entered upon the map of the late Scotch Antarctic Expedition as lying to the eastward of King Oscar Coast, Nordenskiöld shows to have no existence, and severely scores Captain Bruce for rehabilitating this supposed land mass without observations to prove its existence. He also lends the weight of his au-**

* Die Schwedische Südpolar-Expedition und ihre geographische Tätigkeit. Von Otto Nordenskjöld. *Wissensch. Ergebnisse der Schwed. Südpolar-Exped. 1901–1903*, Bd. 1, Lief. 1, 232 pp. Maps, ills. Lithogr. Inst. des Generalstabs, Stockholm, 1911. Mks. 24. 11 x 8¼.

thority for the use of the terms East Antarctica and West Antarctica, the latter a substitute for the veritable babel of names originally applied to and still retained for sections only of the coast and intended as monuments to earlier explorers. The recent discovery by Amundsen that King Edward Land and Victoria Land are connected, in no way destroys the value of this distinction.

Rocks of various intrusive varieties are described which, like those already studied by the Charcot and the earlier "Belgica" expeditions, exhibit close correspondence in characters with the peculiar Andean intrusives which occur along the American cordillera from Alaska to Patagonia. In addition to these intrusive rocks, the corresponding volcanic varieties, and particularly the Andesites, are represented and are closely related to those which have been collected in Patagonia. Thus valuable confirmatory evidence is supplied for the connection of the mountain arc of the South Sandwich Islands with the Andean system.

The portion of West Antarctica which was more carefully studied by the expedition, lies about Admiralty Strait and includes the James Ross, Snow Hill and Seymour Islands. Of these, the first mentioned is much the largest and consists of basalt and basaltic tuff, whereas the other islands of the group are of flat lying sediments of Cretaceous and Tertiary age which form the basement series of the entire district. The uppermost member is a hard, dense schist metamorphosed through contact with the basalt, and beneath this schist are found in turn glauconitic sandstone, shale, hard clay-stone and sandy shale.

Perhaps the most novel and interesting features of the report have to do with the glaciers. The two larger islands are almost buried under white domes of snow and ice (*Eiskuppel*), the irregularities of the rock basement making themselves apparent, however, in marked protuberances of the white surface, though the lithosphere is found exposed only upon the margins. Of Snow Hill Island, upon which the winter quarters were located, all rock was covered save only a small area at the north-east end, and the ice dome extended out at all other margins as an ice foot resting upon the sea. Something approaching this condition appears to belong to the islands of Franz Josef Land within the Arctic region.

Throughout a period of eighteen months measurements were made both upon the rate of accumulation of snow and upon the lateral movement of surface portions of the Snow Hill ice dome at localities about a kilometer back from its margin. Only one of the bamboo rods used for these tests betrayed any appreciable lateral movement during this entire period, and its migration could have been at most but a small fraction of an inch per day. Though the methods used lacked precision, the results may still be interpreted to show that the motion of this ice cap even near its margin is excessively sluggish.

The normal section of the materials composing the glacier of Snow Hill Island possesses considerable interest. Beginning at the top it consists of: (*a*) a thin cover of snow modelled in snow drifts and fixed sastrugi; (*b*) a crust of firmer ice often possessing a coarse, granular cell structure and so thin that the foot sinks through it; (*c*) a layer of variable thickness consisting of snow of the preceding summer and a beautiful alternation of thin laminæ of partially consolidated ice and of névé snow; (*d*) a layer of stratified névé ice varying from nothing to a thickness of twenty meters; and (*e*) the true glacier ice. The borders of the ice dome which covers James Ross Island are curiously indented by broad cirque-like amphitheatres which expose the steep rock wall

XUM

beneath the even surface of the ice dome above. These amphitheatral depressions of the marginal portion of the great ice dome are occupied by glaciers of a new type, the nourishment of which offers interesting problems. In each case one or more narrow ice cascades descend over the wall of the amphitheatre from the glacier dome above. The largest of these glaciers and the one chosen as the type is the Hobbs Glacier, ten km. long, with a wall at the front which is three km. broad. The steep to vertical rock wall everywhere rises above the glacier to the ice dome above except where two narrow cascades connect the higher and lower ice masses. Essentially the same characters are possessed by the Gourdon and Rabot glaciers. Concerning the nourishment of these interesting ice streams, Nordenskiöld says, "they represent a peculiar type of mountain glacier, and above all, a type of very large deep-lying cirque glacier which is nourished both by snow avalanches and ice cascades and by local precipitation."

Nordenskiöld's monograph furnishes the first full account of the shelf ice of the King Oscar coast, and this, he believes, was formed through the loading of sea ice by surface snow precipitated in successive seasons. Studies carried out upon Larsen Bay indicate that there shelf ice of this character is now in process of formation. The main platform of shelf ice, described as the "lower terrace," embraces about 10,000 square miles and has a gentle slope outward from the land and from the higher terrace to the southward, in which respect it differs notably from the shelf ice of the Great Ross Barrier between King Edward and Victoria Lands. Thus to the northward it rises about fifteen meters above sea level, in its central portions it has an estimated elevation of thirty meters, and near the land to the southwest, forty to forty-five meters. Only in the neighborhood of the land does its surface vary from a level plain, but upon this margin it presents notable undulations and often local fissures. From examination of the latter it was learned that the shelf ice there consists of a very regular alternation of blue and white ice layers. To the southward toward the higher ice mass of Jason Land it consists of beautifully bedded layers of névé ice. Nordenskiöld believes the shelf ice to be either floating or resting upon the shallow sea bottom, the outward slope of the upper surface greatly favoring, as it seems to the reviewer, the latter view. Toward the northeast, volcanic islands—the Seal Nunataks—are included. That the shelf ice is in motion outward from the land, Nordenskiöld believes to be proven both by the absence of the compression zone and the presence of numerous fissures along the land margin. Above the shelf ice to the southward is a higher mass of ice—the "higher terrace"—which rises in steps from the shelf ice and has at the base of each step a system of deep and wide fissures. The lowest of these steps rises a distance of some thirty to forty meters from the shelf ice, which is here some fifty meters above the sea. After three successive steps of this sort, the surface of the ice becomes flatter and the succeeding steps less prominent; but there is still an alternation of hills with flat depressions. Above the Borchgrevink Nunatak, at an elevation of more than 250 meters, the surface of the ice plateau is quite level as far as the eye can reach. This interesting body of ice Nordenskiöld has now named the Philippi Glacier in honor of the late Professor Philippi, and while he is unwilling to make a very definite assertion concerning its origin, he appears to favor the view that it is a continental glacier, and it certainly bears a close resemblance to the continental glacier of Antarctica in Kaiser Wilhelm Land.

In view of the manner of origin which Nordenskiöld has assumed for the shelf ice, and we believe that his arguments are well supported, he has included shelf ice as a distinct glacial type in the system which he adopts to apply especially to Antarctic conditions. In it he has recognized clearly the distinction between mountain and continental glaciers:

I. Glaciers of the coast zone and shelf. (*a*) Ice foot glaciers; (*b*) shelf ice.

II. Continental glaciers. (*c*) Inland ice.

III. Transitional forms between continental and mountain glaciers. (*d*) Highland glaciers (Norwegian type); (*e*) true Piedmont glaciers; (*f*) Spitzbergen type.

IV. Mountain glaciers.

Under the head of mountain glaciers, Antarctica furnishes a number of rather special types, among which the Spitzbergen variety, which is almost an ice cap, is particularly common.

Among the many other interesting problems which are treated in this report, perhaps the most novel and instructive are included under the heading "Frost weathering, earth flow, and striped ground." Attention is now being strongly focussed upon this newly exploited series of geological properties having a special application in those high latitude districts where the ground is only partially snow-covered during the warmer months of the year. The pictures which illustrate this section are the finest that have yet been published of "polygonal ground" and "striped ground." Nordenskiöld has shown that these two contrasting types of ground are connected through gradational varieties and are characteristic respectively of flat and sloping surfaces. His studies have further proven that these striking phenomena are notably superficial in character, being restricted to a layer of soil at most a half meter in thickness, which, when saturated with thaw water, slides over the permanently frozen underlying materials. In common with other recent workers upon the subject, he has suggested that regelation may play an important rôle in the migration of the soil and in the differential movements of the rock fragments. Experiments carried out at Snow Hill show that the motions to which these curious structures are due are too slow to be perceived during the period that the station was occupied.

Of the important section of the monograph which deals with the development of surface features upon the land, there remains space only to refer to the striking analogy between these cold humid deserts and the hot and dry areas of lower latitudes. To replace the natural sand blast of the better known deserts which etches out hollows over the softer rock materials, there is here a blast of tuff fragments driven by the Antarctic blizzards which leaves similarly hollowed surfaces on exposed rock masses wherever softer materials are found associated with harder ones. The most that can be done in a review of this nature is to touch a few of the high points in this notable monograph.

WILLIAM H. HOBBS.

XUM

# GEOGRAPHICAL RECORD

## AMERICAN GEOGRAPHICAL SOCIETY

THE LIBRARY. For some months, Dr. Randall-MacIver has been engaged in the classification and re-arrangement of the Society's book collections. This work, now completed, will greatly facilitate reference to any of the many thousands of volumes on the shelves. Works on regional geography are arranged by continents and their subdivisions. The various departments of our subject, such as physical, educational, economic and historical geography, etc., have each its own group of shelves. Government surveys and other official scientific publications form a group and are sub-classified by countries and topics. The publications of geographical and allied societies are arranged according to the languages in which they are printed. The general content of each stack section is lettered on the end of the stacks facing the central passageways. Nearly all the reference books are to be kept in the work rooms from which they may conveniently be distributed to consultants.

THE SOCIETY'S GEOGRAPHICAL COLLECTION. This collection, illustrating the best school material used for geographical education in Europe, has now been exhibited in many schools from the Atlantic to the Pacific coast during the past two years. The exhibition at Oberlin College has just closed and the collection has been ordered home to repair the wear and tear of handling by many thousands of visitors. Two or three exhibitions of it are likely to be given in this city, before it goes on the road again. Prof. George D. Hubbard of Oberlin writes that the map and atlas collection was very much enjoyed there, was continuously on exhibition for two months and was not only studied by students of Oberlin but was visited by many townspeople.

## NORTH AMERICA

POPULATION OF CITIES IN THE UNITED STATES. The Bureau of the Census has just issued a *Bulletin* entitled: "Population: United States. Abstract of Statistics of the Number and Distribution of Inhabitants." Much of it has already been placed before the country, but considerable new data are given in Table 8, "Population of Cities in 1910, 25,000 inhabitants, or more, with per cent. of increase, 1890-1910." The following data relating to all the more important cities of the country are taken from this *Bulletin:*

| City | Population | | City | Population | |
|---|---|---|---|---|---|
| | *1910* | *1900* | | *1910* | *1900* |
| ALABAMA | | | COLORADO | | |
| Birmingham | 132,685 | 38,415 | Colorado Springs | 29,078 | 21,085 |
| Mobile | 51,521 | 38,469 | Denver | 213,381 | 133,859 |
| Montgomery | 38,136 | 30,346 | Pueblo | 44,395 | 28,157 |
| ARKANSAS | | | CONNECTICUT | | |
| Little Rock | 45,941 | 38,307 | Bridgeport | 102,054 | 70,996 |
| CALIFORNIA | | | Hartford | 98,915 | 79,850 |
| Berkeley | 40,434 | 13,214 | Meriden City | 27,265 | 24,296 |
| Los Angeles | 319,198 | 102,479 | New Britain | 43,916 | 25,998 |
| Oakland | 150,174 | 66,960 | New Haven | 133,605 | 108,027 |
| Sacramento | 44,696 | 29,282 | Waterbury | 73,141 | 45,859 |
| San Diego | 39,578 | 17,700 | DELAWARE | | |
| San Francisco | 416,912 | 342,782 | Wilmington | 87,411 | 76,508 |

| City | Population | |
|---|---|---|
| | *1910* | *1900* |
| **District of Columbia** | | |
| Washington | 331,069 | 278,718 |
| **Florida** | | |
| Jacksonville | 57,699 | 28,429 |
| Tampa | 37,782 | 15,839 |
| **Georgia** | | |
| Atlanta | 154,839 | 89,872 |
| Augusta | 41,040 | 39,441 |
| Macon | 40,665 | 23,272 |
| Savannah | 65,064 | 54,244 |
| **Illinois** | | |
| Aurora | 29,807 | 24,147 |
| Chicago | 2,185,283 | 1,698,575 |
| Decatur | 31,140 | 20,754 |
| East St. Louis | 58,547 | 29,655 |
| Joliet | 34,670 | 29,353 |
| Peoria | 66,950 | 56,100 |
| Quincy | 36,587 | 36,252 |
| Rockford | 45,401 | 31,051 |
| Springfield | 51,678 | 34,159 |
| **Indiana** | | |
| Evansville | 69,647 | 59,007 |
| Fort Wayne | 63,933 | 45,115 |
| Indianapolis | 233,650 | 169,164 |
| South Bend | 53,684 | 35,999 |
| Terre Haute | 58,157 | 36,673 |
| **Iowa** | | |
| Cedar Rapids | 32,811 | 25,656 |
| Council Bluffs | 29,292 | 25,802 |
| Davenport | 43,028 | 35,254 |
| Des Moines | 86,368 | 62,139 |
| Dubuque | 38,494 | 36,297 |
| Sioux City | 47,828 | 33,111 |
| **Kansas** | | |
| Kansas City | 82,331 | 51,418 |
| Topeka | 43,684 | 33,608 |
| Wichita | 52,450 | 24,671 |
| **Kentucky** | | |
| Covington | 53,270 | 42,938 |
| Lexington | 35,099 | 26,369 |
| Louisville | 223,928 | 204,731 |
| Newport | 30,309 | 28,301 |
| **Louisiana** | | |
| New Orleans | 339,075 | 287,104 |
| Shreveport | 28,015 | 16,013 |
| **Maine** | | |
| Lewiston | 26,247 | 23,761 |
| Portland | 58,571 | 50,145 |
| **Maryland** | | |
| Baltimore | 558,485 | 508,957 |
| **Massachusetts** | | |
| Boston | 670,585 | 560,892 |
| Brockton | 56,878 | 40,063 |
| Cambridge | 104,839 | 91,886 |
| Chelsea | 32,452 | 34,072 |
| Fall River | 119,295 | 104,863 |
| Haverhill | 44,115 | 37,175 |
| Holyoke | 57,730 | 45,712 |
| Lawrence | 85,892 | 62,559 |
| Lowell | 106,294 | 94,969 |
| Lynn | 89,336 | 68,513 |
| Malden | 44,404 | 33,664 |
| New Bedford | 96,652 | 62,442 |
| Salem | 43,697 | 35,956 |
| Somerville | 77,236 | 61,643 |
| Springfield | 88,926 | 62,059 |
| Worcester | 145,986 | 118,421 |

| City | Population | |
|---|---|---|
| | *1910* | *1900* |
| **Michigan** | | |
| Bay City | 45,166 | 27,628 |
| Detroit | 465,766 | 285,704 |
| Grand Rapids | 112,571 | 87,565 |
| Kalamazoo | 39,437 | 24,404 |
| Lansing | 31,229 | 16,485 |
| Saginaw | 50,510 | 42,345 |
| **Minnesota** | | |
| Duluth | 78,466 | 52,969 |
| Minneapolis | 301,408 | 202,718 |
| St. Paul | 214,744 | 163,065 |
| **Missouri** | | |
| Kansas City | 248,381 | 163,752 |
| St. Joseph | 77,403 | 102,979 |
| St. Louis | 687,029 | 575,238 |
| **Montana** | | |
| Butte | 39,165 | 30,470 |
| **Nebraska** | | |
| Lincoln | 43,973 | 40,169 |
| Omaha | 124,096 | 102,555 |
| **New Hampshire** | | |
| Manchester | 70,063 | 56,987 |
| Nashua | 26,005 | 23,898 |
| **New Jersey** | | |
| Atlantic City | 46,150 | 27,838 |
| Bayonne | 55,545 | 32,722 |
| Camden | 94,538 | 75,935 |
| Elizabeth | 73,409 | 52,130 |
| Hoboken | 70,324 | 59,364 |
| Jersey City | 267,779 | 206,433 |
| Newark | 347,469 | 246,070 |
| Paterson | 125,600 | 105,171 |
| Trenton | 96,815 | 73,307 |
| **New York** | | |
| Albany | 100,253 | 94,151 |
| Binghamton | 48,443 | 39,647 |
| Buffalo | 423,715 | 352,387 |
| Elmira | 37,176 | 35,672 |
| Mount Vernon | 30,919 | 21,228 |
| New Rochelle | 28,867 | 14,720 |
| New York | 4,766,883 | 3,437,202 |
| Manhattan Borough | 2,331,542 | 1,850,093 |
| Bronx Borough | 430,980 | 200,507 |
| Brooklyn Borough | 1,634,351 | 1,166,582 |
| Queens Borough | 284,041 | 152,999 |
| Richmond Borough | 85,969 | 67,021 |
| Niagara Falls | 30,445 | 19,457 |
| Poughkeepsie | 27,936 | 24,029 |
| Rochester | 218,149 | 162,608 |
| Schenectady | 72,826 | 31,682 |
| Syracuse | 137,249 | 108,374 |
| Troy | 76,813 | 60,651 |
| Utica | 74,419 | 56,382 |
| Yonkers | 79,803 | 47,931 |
| **North Carolina** | | |
| Charlotte | 34,014 | 18,091 |
| Wilmington | 25,748 | 20,976 |
| **Ohio** | | |
| Akron | 69,067 | 42,728 |
| Canton | 50,217 | 30,667 |
| Cincinnati | 363,591 | 325,902 |
| Cleveland | 560,663 | 381,768 |
| Columbus | 181,511 | 125,560 |
| Dayton | 116,577 | 85,333 |
| Springfield | 46,921 | 38,253 |
| Toledo | 168,497 | 131,822 |
| Youngstown | 79,066 | 44,885 |
| **Oklahoma** | | |
| Muskogee | 25,278 | 4,254 |
| Oklahoma City | 64,205 | 10,037 |

XUM

| City | Population | |
|---|---|---|
| | *1910* | *1900* |
| **Oregon** | | |
| Portland | 207,214 | 90,426 |
| **Pennsylvania** | | |
| Allentown | 51,913 | 35,416 |
| Altoona | 52,127 | 38,973 |
| Chester | 38,537 | 33,988 |
| Erie | 66,525 | 52,733 |
| Harrisburg | 64,186 | 50,167 |
| Johnstown | 55,482 | 35,936 |
| Lancaster | 47,227 | 41,459 |
| McKeesport | 42,694 | 34,227 |
| New Castle | 36,280 | 28,339 |
| Norristown | 27,875 | 22,265 |
| Philadelphia | 1,549,008 | 1,293,697 |
| Pittsburg | 533,905 | 451,512 |
| Reading | 96,071 | 78,961 |
| Scranton | 129,867 | 102,026 |
| Wilkes-Barre | 67,105 | 51,721 |
| York | 44,750 | 33,708 |
| **Rhode Island** | | |
| Newport | 27,149 | 22,441 |
| Pawtucket | 51,622 | 39,231 |
| Providence | 224,326 | 175,597 |
| Woonsocket | 38,125 | 28,204 |
| **South Carolina** | | |
| Charleston | 58,833 | 55,807 |
| Columbia | 26,319 | 21,108 |
| **Tennessee** | | |
| Chattanooga | 44,604 | 30,154 |
| Knoxville | 36,346 | 32,637 |
| Memphis | 131,105 | 102,320 |
| Nashville | 110,364 | 80,865 |
| **Texas** | | |
| Austin | 29,860 | 22,258 |
| Dallas | 92,104 | 42,638 |
| El Paso | 39,279 | 15,906 |
| Fort Worth | 73,312 | 26,688 |
| Galveston | 36,981 | 37,789 |
| Houston | 78,800 | 44,633 |
| San Antonio | 96,614 | 53,321 |
| **Utah** | | |
| Salt Lake City | 92,777 | 53,531 |
| **Virginia** | | |
| Lynchburg | 29,494 | 18,891 |
| Norfolk | 67,452 | 46,624 |
| Richmond | 127,628 | 85,050 |
| Roanoke | 34,874 | 21,495 |
| **Washington** | | |
| Seattle | 237,194 | 80,671 |
| Spokane | 104,402 | 36,848 |
| Tacoma | 83,743 | 37,714 |
| **West Virginia** | | |
| Huntington | 31,161 | 11,923 |
| Wheeling | 41,641 | 38,878 |
| **Wisconsin** | | |
| La Crosse | 30,417 | 28,895 |
| Madison | 25,531 | 19,164 |
| Milwaukee | 373,857 | 285,315 |
| Oshkosh | 33,062 | 28,284 |
| Racine | 38,002 | 29,102 |
| Superior | 40,384 | 31,091 |

**Frost Prevention in Nevada.** The Department of Meteorology and Climatology of the University of Nevada, under the direction of Professors J. E. Church, Jr., and S. P. Fergusson, is carrying on an extended investigation of the conditions of frost occurrence and of the methods of frost prevention in Nevada. In connection with this work, a "temperature survey" of the valley lands of the State is being made, for the purpose of discovering districts thermally adapted for the raising of fruits. The results thus far obtained have been published recently (*Bull.* 79, Agric. Exp. Sta., Univ. of Nev., 1912), and much information of general value to fruit growers in other States also is given. This bulletin is intended "for the definite purpose of bringing conviction to the minds of Nevada fruit growers that fruit can be successfully grown even in seasons when frosts are persistent and destructive, and in places considered more unfavorable than any at present occupied by orchards." Experiments have shown that orchards in Nevada, even when the temperature falls as low as 22° F. and frosts occur persistently, can be protected during the season at an expense varying from seventy-three to ninety-five cents per tree. This estimate includes one-tenth of the original cost of the heaters with fifty per cent. added for depreciation and interest, but does not include possible expense for extra labor. In an orchard of 250 trees, the average expense for each of 13 heatings was 5.6 cents per tree.

Windbreaks of Russian oleasters, lopped poplars or willows and Lombardy poplars are a great help in economical and effective orchard heating, and are

absolutely essential to success wherever the wind is strong. By means of recording thermometers, or a set of maximum and minimum thermometers, frost can be predicted with reasonable certainty. By using an automatic frost alarm, the exhaustion attendant upon "night watching" can be avoided. According to a temperature survey of the Truckee Meadows, and the climatological records of the Weather Bureau, the Humboldt, Truckee, Carson, Walker and Vegas Basins contain areas that can be adapted by orchard heating to the raising of fruit.

R. DEC. WARD.

PRECIPITATION AND STREAM-FLOW OF THE OHIO RIVER AT CINCINNATI. Professor J. Warren Smith, of the U. S. Weather Bureau at Columbus, Ohio, has investigated "The Relation between the Precipitation over the Watershed of the Ohio River above and the Stream-Flow at Cincinnati" (*Bull.* No. 40, U. S. Weather Bureau, 1912). The period covered is 50 years, from 1861 to 1910, inclusive. The data are tabulated for each month of each year; for combinations of months for each year of the entire period; for each month of 10-year and 25-year groups of years. The conclusions reached are as follows, the author saying that these statements "are proven beyond dispute." There has been a very slight decrease in flood days in recent years, with the same rainfall. The same amount of rainfall causes a better flow of water in the river during the low-water period than formerly. The number of low-water days was 14 per cent. less during the past twenty-five years than during the preceding twenty-five, calculating for the same rainfall. During the ten years ending with 1910 the tendency for low water, with an equivalent rainfall, was not so great as for any preceding 10-year period for the past fifty years. Floods do not occur at Cincinnati during February and March unless the precipitation for these months is in excess of the normal, except on very rare occasions.

R. DEC. WARD.

THE FLORIDA KEYS: *Erratum.* In the article on the completion of the Florida East Coast R.R. by R. M. Harper in the February number of the *Bulletin*, Key Biscayne, southeast of Miami, was inadvertently stated (p. 90) to be the northernmost of the typical Florida keys. This designation applies to Soldier Key, about thirteen miles south of Miami in 25°35′ N. lat. and 80°10′ W. long. (cf. Coast and Geodetic Survey charts Nos. 165 and 166). Key Biscayne, on the contrary, is the southernmost of the sandy barrier beaches which fringe the east coast of Florida. Reference to this fact will be found in a discussion of the natural provinces of the state in a report by the above author in the Third Annual Report (for 1909-1910) of the Florida State Geological Survey (p. 229).

The most comprehensive account of the geology of the Florida Keys is that of Samuel Sanford in the Second Annual Report of the same survey (pp. 195-198, 214-221, 229-230), which gives many references to previous literature. Regarding the vegetation of the Florida Keys no complete description has ever been attempted, but short semi-popular papers on the subject have been published by A. H. Curtis in *Garden and Forest* for Aug. 8, 1888, and by Dr. J. K. Small in the *Journ. of the N. Y. Bot. Garden* for March, 1909, and July, 1911.

DR. JOCHELSON'S WORK IN THE ALEUTIAN ISLANDS. Among the many interesting papers to be presented to the eighteenth International Congress of Americanists, the account of the expedition of the Imperial Russian Geographical Society to Kamchatka and the Aleutian Islands, by Dr. Waldemar Jochelson, is specially worthy of note. The expedition, of which Dr. Jochelson was in charge

XUM

of the ethnological section, was fitted out in 1908 at the expense of a Russian banker, M. F. P. Riobanschinsky. The expedition excavated thirteen ancient village sites and three burial caves, and explored shell-heaps and other kitchen-midden deposits of the Aleutian Islands. The collections brought back by the expedition included skeletons and skulls, and many prehistoric objects of stone and bone. In addition, much information as to the Aleutian language, folklore, and religion was secured. In 1910 the party crossed to Kamchatka, where old underground dwellings and fortifications were explored, and ancient pottery, the existence of which has been denied by former travelers, was found. The discoveries throw much light on the early relations of Kamchatka and Japan. Dr Jochelson will also discuss the morphological relations of the language of Kamchatka and of the American Indians, and the identities which he has discovered in their mythology and that of the Indians of the north-west. (*Nature, Vol. 89, 1912, No. 2221, p. 301*).

## SOUTH AMERICA

Geographical Material Destroyed by Fire. In a fire at Rio de Janeiro, on Sept. 15th last, that destroyed the National Printing Establishment, the Instituto Historico e Geographico Brazileiro lost all the originals of the third volume specially devoted to the "Centenario da Imprensa no Brazil" and containing catalogues of newspapers published in many of the states of that republic. The originals of part 2 of Volume 73 of the *Revista,* being the number for 1910, were also lost. This volume was to contain, among others, an article entitled "Contribuicão para uma futura carta ou mappa do Estado de Minas Geraes" by Dr. Nelson de Senna.

## AFRICA

Geographical Progress on the Libyan Coast. According to the *Rivista Geografica Italiana* for May, 1912, the Italian government steamer *Ciclope* has just completed a cruise from Tripoli to Tobruk on the North African coast. About 14,000 soundings were taken for the preparation of a chart of Tripoli harbor. The ship was subsequently detailed to an exploration of the coastal sea within the east-west limits given above. Dr. A. Manuelli was the chemist attached to the expedition, which Dr. A. Sella also accompanied as biologist. The results obtained in the course of this cruise will serve as a basis for the elaboration of a program of thalassic investigation in that region. On the other hand, work has begun in the nautical meteorologic station erected in Tripoli while the Bengazi observatory is being built under the supervision of the officials of the Royal Geographic Institute who will have charge of its work.

The Natives of the Kharga Oasis, Egypt. The Smithsonian Institution has just issued a report under this title prepared by Dr. Ales Hrdlicka, curator of physical anthropology at the National Museum, who recently spent nearly four months at this oasis in the Libyan Desert collecting his material for the report. He was sent to Kharga by the Smithsonian Institution, the National Museum and the Metropolitan Museum of New York to study the physical characteristics of the natives. The oasis is about 130 miles west of Luxor and, owing to the isolation of its people, it was believed that they might be regarded as representing the old inhabitants of the region who probably settled there about 2000 B. C. Dr. Hrdlicka examined and measured only those showing normal de-

velopment and apparently free from negro admixture. Out of a total population of about 10,000, including some Bedouans, he confined his studies to 150 individuals. He found that the type of the Kharga natives is radically distinct from that of the negro. It appears to be fundamentally the same as that of the non-negroid Egyptians of the Nile Valley, is a composite of closely related northeastern African and southwestern Asiatic ethnic elements, and is to be classed as part of the southern extension of the Mediterranean subdivision of the white race.

## EUROPE

THE JUNGFRAU RAILROAD. The recently completed stretch of the Jungfrau Railroad, between Eismeer and Jungfrau Joch, carries this greatest of all mountain roads far towards completion. The tunnel station of Eismeer (10,333 feet) was opened in June, 1907. The newly opened section, 2.8 miles in length, has a very steep grade, leads deeper into the mountain and reaches the tunnel station of Jungfrau Joch at an elevation of 11,304 feet. The remaining part of the railroad will be a cog line. At its final halting place the line will be 230 feet below the top of the mountain. (*Kartogr. und Schulgeogr. Zeitschr. No. 4, 1914*).

A MONUMENT TO J. JANSSEN. A Committee composed of distinguished men of science in many countries and under the presidency of M. H. Poincaré of the French Academy of Sciences has been organized to collect funds for the erection of a monument to J. Janssen, the founder of the observatory on the summit of Mont Blanc and at Meudon, and whose important contributions to physical astronomy are well known. It is designed to make the monument a work of art which will recall the eminent services rendered by Janssen to science. Societies and individuals in all countries are invited to send their contributions to the Treasurer of the Committee, Mr. M. H. Dehérain, Librarian of L'Institut de France.

## POLAR

### ANTARCTIC

WILKES'S WORK FULLY ENDORSED, AT LAST, BY A BRITISH AUTHORITY. Dr. William S. Bruce, of Scotland, well known for his scientific explorations both in the Arctic and the Antarctic, has a paper "The Australasian Antarctic Expedition, 1911," in *The Scottish Geographical Magazine* (June, 1912, pp. 314-318), liberal quotations from which are here made:

"News has been received in this country of the successful landing of the Australasian Antarctic Expedition, under the leadership of Dr. D. Mawson, on Adelie Land. Unfortunately, just as the American discoveries by Johnson and Morrell in the Weddell Sea were discredited without much reason in Britain during the whole of last century, so also the American discoveries to the south of the Indian Ocean made by Wilkes were discredited not only in Britain but also in Europe generally.* Anyone, however, who has carefully read Captain Wilkes's narrative must have felt that there was sufficient evidence for the American discoveries, and the writer, for one, has always upheld the view that those lands would be found to exist more or less in the position in which Wilkes charted them . . . The Mawson Australasian expedition has proved, over a

* It should be said that many continental geographers have, for years past, accepted the discoveries of Lieut. Wilkes and recorded them in their writings and on their maps.—EDITOR BULLETIN.

distance of more or less 1,200 miles, the existence of Wilkes Land, which has been disputed during the past seventy-two years, and has set up stations at the west, and almost at the east end of it. Dr. Mawson has therefore done much to support the theory of there being one continental land-mass round about the South Pole, and as a geologist, as well versed in Australian and Antarctic geology as any living man, he will be certain to bring back a rich harvest of valuable results bearing on the formation of Antarctica. His oceanographical survey between Antarctica and Australia will also be a most valuable contribution to Geography and biology, and the meteorological and magnetic observations cannot fail to be of economic worth."

From the reports sent home by Dr. Mawson, the Scottish explorer is able to make an excellent summary of the work thus far done by the Australasian expedition:

"No expedition has ventured during seventy-two years to approach this forbidding land again, until this courageous Australian launched forth, fully determined to make out what he could concerning it, and to endeavor to find what relationship it had to Victoria Land and the rest of the Antarctic Continent, as well as to Australia and New Zealand. Thus it was Mawson's plan to land three parties on this practically unknown coast, and he has, by successfully landing two parties, accomplished more than could have been hoped for by those who know. The coast was discovered by Captain d'Urville on Jan. 21, 1840, and was visited by Wilkes on Jan. 30 of the same year.* Dr. Mawson has himself landed with a party of fourteen at Point Alden, the eastern part of Adelie Land, where he has set up an encampment, and is at present spending the winter with the intention of carrying on meteorological, magnetic, geological and other scientific investigations, while exploring the land and seas in the vicinity from a topographical aspect. The reports meanwhile available give the most meager description of this interesting land, evidently because Dr. Mawson and his companions were entirely occupied in landing stores and equipment and setting up the house for winter quarters. The approach to Wilkes Land was made not without difficulty on account of fogs, snow and heavy gales. The ice-pack, also was not negotiated without difficulty. After leaving Macquarie Island and 'proceeding some days west-south-west', says Lieut. Mennis, 'we sighted a barrier very similar to the Ross Barrier, varying from forty to 100 feet in height, with an irregular edge running generally south. Afterwards, we passed rocky islets just off what appears to be the northern extremity of the southern ice-cap. On Jan. 9, while it was blowing a heavy gale, we sighted some more land jutting out from the barrier's edge, and we made for it. As there were numerous small islands and rocks just awash, and with the soundings showing a very irregular bottom, the ship was brought-to about two and a half miles out. As we were already further west than we had intended to make our main base, Dr. Mawson and I, with Bickerton and five others, lowered a whale boat and pulled in. We found the land to be the out-

* "On the 19th of January, 1840, in longitude 154°30′ E., latitude 66°20′ S., Lieut. Charles Wilkes sighted, or believed that he sighted, land to the south. On the same day, in longitude 153°40′ E., latitude 66°31′ S., Lieut. Hudson also thought he saw land to the south. Other officers, among them Lieut. Alden, Gunner Williamson and Passed Midshipman Colvocoresses, made statements to the same effect. The American vessels sailed westward, and on the 22nd and 23d of January reported land again. They then continued their cruise to 97°37′ E., along this coast which Lieut. Wilkes named 'The Antarctic Continent,' and which has since justly been called Wilkes Land." (Edwin Swift Balch, *Bull. Amer. Geogr. Soc., Vol. 38, 1906, p. 30.*)

crop from that covered by the ice-sheet, and composed of ice-worn rocks and loose boulders and moraine, about a mile long and half that depth, the highest point being about 200 feet.'

"At Point Alden, a fine boat harbor was found, and enough water for the ship to get within 200 yards, so Dr. Mawson decided to set up his first station at that point. The landing was not effected without difficulty, on account of very heavy gales and low temperature. The ice-cap in this region rises very rapidly up to about 2,000 feet, and the coast is described as a bad one, 'all heavily ice-clad and badly crevassed, fairly steep slope from about 2,000 feet, and finishing with a cliff face 100 to 300 feet. Occasionally we saw a rock in the face, but very seldom.'

"Having landed Dr. Mawson, Capt. Davis, who is master of the *Aurora,* proceeded to the westward in a more or less zig-zag course, along about the 65th degree of latitude, and about 250 miles to the westward, he discovered land rising to a height of 2,500 feet, very much of the same character as Adelie Land, but considerably further south than the land charted by Wilkes in these longitudes. It was impossible to get nearer than eighteen to twenty miles from this land on account of the close and heavy nature of the pack-ice. Consequently the *Aurora* steered a course westward, and ultimately landed a party under the leadership of Mr. Wild on about the Antarctic Circle, (66°21′ S.) in Long. 95°9′ W., 1,200 miles west of Dr. Mawson's station. It is interesting to note that this is the land, to which I have already referred, charted and called Termination Land by Captain Wilkes, whose existence has been doubted by others. It is therefore of extraordinary interest that the party of the Australasian expedition under Mr. Wild has not only confirmed Wilkes's discovery of Termination Land, but has actually landed and set up winter quarters there. The landing of this party was an even more remarkable accomplishment than the landing of Dr. Mawson's party. For one reason, it was fully a month later in the season, and was accomplished under most difficult circumstances, the stores having to be got up by means of shear-legs on to the top of a precipitous ice-cliff 100 feet high."

In landing on Termination Land, the party ascended a glacier which Mr. Wild says should eclipse the Beardmore, which Shackleton and Scott ascended, by at least fifty miles in length and fifty in width. Dr. Bruce adds that the oceanographical survey which the *Aurora* is carrying on between Australia and Wilkes Land closely resembles the work of the Scottish expedition, the special object being to make a deep-sea survey which shall indicate what previous continental connections there have been between Australia and this part of the Antarctic Continent.

American Discoverers of the Antarctic Continent. Major-General Greely, U. S. A., has an excellent paper with this title in the March number of the *National Geographic Magazine,* in which he summarizes the evidence that the original discovery of what is now known as West Antarctica was made by Nathaniel B. Palmer, of Stonington, Conn., in January, 1821. As Mr. Balch wrote in the *Bulletin* of our Society ("Stonington Antarctic Explorers", Vol. 41, 1909, pp. 473-492), Palmer, a little after his discovery, fell in with Captain Bellingshausen, commander of the Russian expedition then engaged in Antarctic explorations, and told him of the land he had found. Palmer's work was discredited in England and it has been affirmed there that the Russian captain made no reference in his book to his meeting with Palmer or to the latter's

XUM

discovery; but Gen. Greely quotes from Henryk Arctowski, who said in a paper in the *Geographical Journal* (Vol. 18, 1901, pp. 353-394) that Bellingshausen did describe his meeting with Palmer in the second volume of his book, pp. 263, 264, published in 1831. It was this Russian explorer who named the part of West Antarctica which Palmer revealed, Palmer Land, and it appeared on the maps till the British replaced it by Graham Land in honor of the first Lord of the Admiralty. Palmer was the discoverer of West Antarctica, which is now believed to be a northerly projection of the Antarctic continent.

Much of General Greely's paper is given to Lieut. Wilkes's discovery of some 1,200 miles of Antarctica, his application of the name The Antarctic Continent to the great southern land mass and the campaign of abuse and detraction that was visited upon him for two generations by unfriendly critics on the other side of the Atlantic.

## ECONOMIC GEOGRAPHY

WHALING IN SOUTHERN SEAS. The number of companies fishing for whale in 1912 in the south seas is about thirty-five in addition to the twenty companies in northern seas. Whales are most plentiful in southern waters around South Georgia, South Shetland, Kerguelen, and on the coasts of South America and Africa. They are decreasing in number in northern seas and the catches there made have been light in recent years.

Consul General Bartleman reports that in the Falkland Islands and their dependencies more than 8,000 whales were taken last season. Factories at South Georgia reported 5,000, and plants in the Falklands, South Shetlands, South Orkneys, Graham Land, and South Sandwich Group accounted for approximately 3,000. In the latter places there are about a dozen whaling companies, while in South Georgia alone there are seven such enterprises which employ over 1,000 men during the season. The 50 whalers owned by these companies are equipped with the most modern implements for catching, towing, and manipulating whales, and the large steam floating factories are fitted up with improved machinery and ingenious apparatus for extracting oil.

The January number of the *Revista Zootécnica,* Buenos Aires, contains an article on whaling which shows the numerous uses created for whale oil and other whale products that have led to a very profitable development of the whaling industry; notwithstanding the constantly increasing quantity of oil and whalebone, prices continue to rise. A Norwegian whaling company, operating in the Antarctic seas, recently paid dividends equal to 70 to 85 per cent. of the capital invested. The demand for whale products is so great that 75 per cent. of the catch for 1910 was sold in advance. A catch of one whale a week per vessel is considered very satisfactory.

The industry is of growing importance in Chile. The Corral Whaling Co., with headquarters at Corral, gives employment to 200 men. Two hundred whales is the average annual catch, from which 10,000 barrels of oil are extracted. The largest whale so far caught by this company measured 125 feet and yielded 100 barrels of oil. (*Daily Cons. and Trade Rep., No. 136, 1912.*)

## PHYSICAL GEOGRAPHY

ORIGIN OF THE CENTERS OF ACTION OF THE ATMOSPHERE. The control of our daily weather conditions by the cyclonic and anticyclonic areas which appear on our weather maps is a very familiar matter to the large majority of the

people of every civilized country. Further, the general principles upon which weather forecasting from day to day depends are also very widely known to be based on the characteristics, relations and movements of these same low and high pressure areas. In view of the importance of these local pressure conditions in controlling our daily weather changes, it is surprising that the importance of the control over weather and climate exercised by the much larger, so-called permanent areas of low and high pressure, over oceans and continents ("Centers of action"), has only very recently begun to be recognized. It is now becoming more and more clear that seasonal characteristics of our weather, and great characteristics of our climates, may often be traced back to special temporary peculiarities in the development, or position, of these permanent cyclones and anti-cyclones. Hence, every advance in our knowledge of the conditions affecting the latter is an important step toward long-range forecasts, and toward a better understanding of the climates of the world.

Dr. W. J. Humphreys, of the Mount Weather Observatory, in a recent study of "The Origin of the Permanent Ocean Highs" (*Bull. Mt. Wea. Obs.*, Vol. IV, Pt. I, 1911), finds that, in addition to the dynamic control of these highs, arising from the "thrusts" of the westerly winds toward the equator and the easterly winds toward the poles, there is a thermal control which has not received attention. The latter he believes to be due to the cold ocean currents which cross the zone of the highs, lower the air temperatures and thereby produce a higher pressure. The unsymmetrical location of the permanent ocean highs, toward the eastern sides of the oceans, is believed to be essentially due to the fact that the cold water is on that side. A maximum ocean high must, Dr. Humphreys concludes, be "at that place where the mechanical and thermal causes combine to produce the greatest result, that is, a little to the west of the intersection of the coldest portion of an ocean current with a high pressure belt." It may be added that Dr. Humphreys' emphasis on the control exercised by these cold currents gives rise to the suggestion that the conditions which determine, from year to year, stronger or weaker, colder or warmer currents, deserve careful study, if upon currents depend the ocean highs which, in their turn, control the winds and weather of distant lands.

In another paper in the same number of the *Bulletin of the Mount Weather Observatory*, on "The Aleutian and Icelandic Lows," Dr. Humphreys points out that the reason for the perpetual Icelandic low is the perpetual ice over the high regions of Greenland and Iceland, while the Aleutian low is a phenomenon of the winter only, owing to the high summer temperatures of Siberia and Alaska.

R. DEC. WARD.

THUNDERSTORMS OVER TROPICAL ISLANDS. The frequent occurrence of thunderstorms over mountainous tropical islands is the natural result of the favorable opportunity for the development of local convectional currents, reinforced by the diurnal ascending winds which depend upon the topography. In a recent discussion of this subject (*Das Wetter*, April, 1912), Dr. Kurt Wegener brings out some interesting points in connection with the thunderstorms of the islands of Savaii and Upolu, of the Samoan group. Even during the dry season (the southern hemisphere winter) thunderstorms are of almost daily occurrence. The cumulus clouds are carried from the ocean towards the mountains in the forenoon; collect over these mountains, and grow into heavy cumulo-nimbus towards evening. These immense cloud masses, usually reaching a height of six miles,

serve to indicate the position of the island to approaching vessels long before the highest mountains themselves can be seen from the ocean. The clouds extend further to leeward than to windward, but the rainfall is heavier on the windward slopes. This difference in rainfall, as well as the difference in sunshine, has a very noticeable effect upon the distribution of vegetation. The thunderstorm activity is far greater in the rainy season (summer) than in the dry season, when the trades blow.

Dr. Wegener's observations lead him to the view that the lightning in tropical thunderstorms is just as severe and strikes just as often as it does in extratropical thunderstorms, although the prevailing opinion is to the contrary. From a series of observations collected in the Samoan Islands it appears that lightning strikes there even oftener than it does in Germany. One cocoanut palm out of 200 is struck annually on Upolu and on Savaii. The inhabitants of the tropics live so often in the midst of tropical forests, or in plantations of cocoanut, cacao, rubber, and other trees, that the damage done to the tree tops attracts comparatively little attention. Moreover, in damp, tropical climates the trees, with the exception of the cocoanut palm, suffer comparatively little damage. The cocoanut palm, whose trunk is very dry, is frequently broken off just below the crown.

R. DEC. WARD.

LOW TEMPERATURES AND VEGETATION. Two recent papers by Forrest Shreve, of the Desert Botanical Laboratory of the Carnegie Institution, at Tucson, Ariz., deal with inversions of temperature, and with the duration of cold, and their effects upon the distribution of vegetation in the vicinity of the Laboratory. In "Cold Air Drainage" (*The Plant World,* XV, May, 1912, 110-11) the results of observations of minimum temperatures made from April to October, at altitudes of 4,000, 6,000 and 7,000 feet in the Santa Catalina Mountains, as well as of other related observations, are discussed. The general facts of temperature inversions are similar to those which have been determined for other localities, but they are very striking in this region of great aridity and of much clear sky. The "abrupt change of temperature at a particular level" was noticed when the observer returned to the bottom of the cañon after making the readings on the slopes, and this "level became higher as the evening advanced." In fact, "the floor of the cañon was filled with a veritable stream of cooled air with a very definite surface." The importance of this nocturnal distribution of temperature for vegetation is obvious. For example, in the locality under discussion, the minimum temperatures found on one of the ridges at 7,000 feet are found at only 4,650 feet in the cañon. The author has noted that a number of desert species range to a much higher altitude on ridges and the upper slopes of cañons than they do in the cañon bottoms and on the lower slopes. In the second paper, "The Influence of Low Temperatures on the Distribution of the Giant Cactus," the author discusses the relations which he has discovered between the duration of cold and the distribution of *Carnegia gigantea* (*Cereus giganteus*). It appears that the maximum number of consecutive hours of freezing is the most important climatic element in determining the northward range of this plant. The giant cactus is capable of withstanding nineteen hours of continued freezing temperatures, and a minimum as low as 17° Fahr., as shown by the temperature records at Yuma, Phœnix, Tucson and Flagstaff. An experimental study with a number of young potted giant cacti exposed to freezing temperatures (in freezers) confirmed these results. The plants which were exposed to from twenty-nine to forty-six hours of freezing were unable to with-

stand the cold, while those exposed for from six to fifteen hours survived. All this shows how important are detailed observations of temperature at different altitudes in studies of plant distribution. R. DEC. WARD.

NOTES ON NORTH ATLANTIC CURRENTS AS DEDUCED FROM THE COURSE OF DERELICTS. In a recent contribution to the *Bulletin* de la Société de Géographie de Lyon (Vol. IV, Fasc. 1, 1911, p. 68) Mr. Hautreux deduces some interesting conclusions relating to the North Atlantic currents, based on a study of the course of derelicts as shown by the Pilot Charts of the U. S. Hydrographic Office. The writer says that the data obtained from the drift of derelicts are likely to throw more light on the movement of ocean currents than those gathered by means of sealed bottles. This is because the former are less subject to the influence of winds and extend deeper below the surface of the sea; also because passing steamers carefully note their position so that their itinerary can be plotted, while, on the other hand, only the original and final positions of drifting bottles are known. It appears from these notes that the currents known as the Canary Islands Current, the North Equatorial Current, and the Gulf Stream form a closed barrier around what is known as the Sargasso Sea. The Gulf Stream itself, after leaving Cape Hatteras, does not extend in a north-easterly direction towards Europe, as usually shown on maps, but takes instead an easterly course and heads for the Azores. After these islands are attained the current becomes affected by northerly winds and is deflected towards the south-east and the south. The warm currents along the Irish and Norwegian coasts are due to the prevalence of westerly or southwesterly winds and the consequent easterly set of the surface waters of the North Atlantic.

The course of derelicts reveals a current counter to the Gulf Stream. This hitherto unmapped body of water passes between Bermuda and the Bahamas, traveling in a southwesterly direction at a speed of from four to ten miles in twenty-four hours. The course and speed of these currents are exceedingly complex and wholly devoid of uniformity. Gusts of wind, and squalls cause them to deviate considerably from their normal course, sometimes bringing about stops or even retrogressions in direction. It also appears that the speed of these currents is largely in excess of that deduced from a study of the drift of sealed bottles. In the center of the North Atlantic, the drift of derelicts tends to show that their speed is four or five times greater than the rate of floating objects much smaller in size. The speed also varies according to the season of the year. Around the Sargasso Sea, it attains its maximum in summer and its minimum in winter. In the Gulf Stream it varies between ten and thirty miles a day with an average of eighteen miles. The North Equatorial Current travels at a speed of ten miles in winter and twenty in summer. It thus appears that the maximum speed is attained about the time the trade winds begin to shift towards the north. LEON DOMINIAN.

## PERSONAL

CAPTAIN AMUNDSEN. On returning to Europe in September, Capt. Amundsen will make his first address before the Norwegian Geographical Society in Christiania. A few days later he will lecture before the Berlin Geographical Society and later in other cities in Germany, Austria and Switzerland. He will address the Royal Geographical Society in London on Nov. 18.

On April 16, the Storthing of Norway unanimously voted a grant of 136,365 kroner (about $36,818) to Captain Amundsen's North Polar Expedition.

F. V. EMERSON. Prof. F. V. Emerson of the University of Missouri is at work this season for the U. S. Soil Survey in the Ozarks of Missouri.

A. G. MADDREN. A. G. Maddren, of the Alaska Division of the U. S. Geological Survey, left Washington the last week in April bound for Seattle. He is on his way to the Upper Porcupine River, for the purpose of completing, during the coming summer, a geologic examination of the international boundary from the Porcupine to the Arctic coast.

J. B. TYRRELL. J. B. Tyrrell, of Toronto, is to head the Ontario Government Expedition to locate the five-mile strip on Hudson Bay which the province is to receive from the Dominion. His party, consisting of one or two surveyors and a half-dozen Indians, will probably proceed to Winnipeg the last of May, and thence by Lake Winnipeg to Port Nelson. A large part of five months will be spent along Hudson Bay. Mr. Tyrrell has personal knowledge of the Hudson Bay district, which will make his services of especial value. (*Economic Geology*, Vol. 7, 1912, p. 311.)

## GENERAL

RECENT CENSUS RESULTS. The population of Servia, according to the census of Dec. 31, 1910, is 2,911,701, an increase of 8 per cent. since the census of 1905. The largest cities are Belgrade (89,876 inhabitants) and Nisch (24,949).

The population of the Commonwealth of Australia, according to the census of April 3, 1911, was 4,474,944, of whom 72,282 were colored or mixed breeds. The increase since the census of 1901 was 17.32 per cent. The distribution of the population was: New South Wales, 1,648,746; Victoria, 1,315,747; Queensland, 614,500; South Australia, 409,997; Western Australia, 288,483; Tasmania, 191,214; North Territory, 4,533.

The population of Algeria, according to the census of March 5, 1911, was 5,563,828, of whom 795,522 were Europeans. The increase since the census of 1906 was 7.9 per cent.

RESEARCH DEPARTMENT OF THE ROYAL GEOGRAPHICAL SOCIETY. The afternoon meetings that have been held for the discussion of research topics will no longer be regarded as departmental meetings but as meetings of the Society as a whole. In other words, this activity has been very successful and it has been decided to include it in the general work of the Society. *Nature* (May 30, 1912) says that at the last meeting of the Department, on May 23, the Chairman, Prof. Myres, pointed out that the important branches of study that had come under the purview of this section of the Society included new methods of surveying, problems of geomorphology (especially those effecting rivers and coasts), of hydrography and climatology, various regional and synthetical studies and investigations from the point of view of distribution, physical changes within historical times, and the exploration or investigation of particular territories with special regard to conditions affecting their settlement and economic development.

# GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

## BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

### AMERICA

**Annals of the Association of American Geographers. Vol. I, 1911.** Maps, ills., index. Published by the Association. $3 unbound; $3.50 bound. Richard E. Dodge, Editor, Washington, Conn. 10½ x 7½.

The first volume of the *Annals of the Association of American Geographers* appeared this spring with date 1911, the year of the Pittsburg meeting (Dec. 1910, Jan. 1911). Though introduced by Cowles's interesting Presidential address on the causes of vegetational cycles, the main feature of the issue is W. M. Davis's "Colorado Front Range," the newest and most elaborate of the studies in physiographic presentation that have almost wholly occupied Professor Davis of late years. It is also the clearest and most convincing, unless the present writer is biased unduly by having been on the ground with the author at the time of these studies.

It is undoubtedly the best account of the region, a result to which Professor Davis's quite unique sketches contribute very much. Professor Davis would make all geographers his debtors if he could expound the method of his sketching. An item of much interest is the generously recognized work of A. F. Marvine, done nearly half a century ago. Briefer papers are Brooks's "Alaska Coal," adequate to supply the whole Pacific coast for a long period, but for "our unfortunate public land policy"; Atwood's "Mesa Verde," Fassig's "Climate of Porto Rico" and C. A. Davis's "Salt Marshes.' The last fifty pages consist of titles and abstracts of papers presented to the Association from 1904 to 1910, a valuable list, and it would have been still more so had the editor given in more cases the reference to the place of publication of papers.

The publication is in excellent form (7¾ by 10½ inches), well printed on good paper with wide margins. It is an admirable volume and invites wide attention to the future publications of the Association. MARK JEFFERSON.

**In Northern Labrador.** By William B. Cabot. xii and 292 pp. Maps, ills., appendix. Richard G. Badger, Boston, 1912. $2.50. 9 x 6.

This book is the record of several summer trips to northern Labrador, mostly along the Assiwaban River. The bleak glaciated topography, the hot summer days with their hordes of mosquitoes, the northern Indian and the Eskimo are made real by the author's descriptions.

Mr. Cabot could speak the local dialects. His admiration and good will are for the Eskimo rather than the Indian. The former he regards as industrious, peaceable and trustworthy in contrast to the Indian. Here especially the customs are mainly an outgrowth of the environment. "Death comes from the northeast" is the description of the raw, damp northeast winds. A green branch hung on a pole gives the time when the last travelers passed; the length of time is inferred by the withering of the foliage.

It is fortunate that the author's knowledge of geology enables him to convey to his reader a correct idea of the bare, smoothed surfaces, erratics and the glacial lakes and streams. The statement (page 3) that "six thousand years may well cover the time since the ice departed" is bold indeed; professional geologists, as far as the reviewer's knowledge goes, have not been able to estimate post-glacial time so closely. The drowned coast with the "runs" behind the submerged islands gives easy sailing and fishing and leaves a line of



XUM

trading stations along the inner coast. The author's description of the lower Assiwaban gorge with falls in the lower part, hanging valleys and well-defined terraces makes the geological reader desire to visit the locality. The illustrations add to the value of this readable book. F. V. EMERSON.

**The Aborigines of Minnesota.** A Report based on the Collections of Jacob V. Brower, and on the Field Surveys and Notes of Alfred J. Hill and Theodore H. Lewis. Collated, Augmented and Described by N. H. Winchell. xiv and 761 pp. Maps, ills., index. The Minnesota Historical Society, St. Paul, Minn., 1911. 12½ x 9½.

This volume is crowded with a stunning amount of detail. It is hard to conceive that anything now remains to discover in connection with the story of the Indians in Minnesota. Yet there has been one great lack, an editor. It appears that this work was cumulative. It began with the collection of data by Alfred J. Hill. In this he availed himself of the field work of Theodore H. Lewis. Their work next devolved upon Jacob Vradenburg Brower. Last of all the accumulation fell into the hands of Prof. N. H. Winchell. The record is not inaptly, though somewhat with over-estimation, set forth by Prof. Winchell: "Mr. Hill plowed the field where Mr. Lewis sowed the seed, the fruit of which Mr. Brower garnered; it is simply the putting of this fruit into the current markets of archæology which has fallen to the writer." And to the lack of an editor must be added the lack of such an exhaustive index as should render this storehouse of facts available for use.

It is possible to dip into these pages almost at random and emerge with something worth knowing, but there is nothing to direct the search. We would not seem to discredit the Minnesota Historical Association. It has produced a monumental work at great expense. It is a credit to an unendowed society. The work is done with great and quite successful striving after mechanical accuracy. The best that can be expected of the work is that it shall be a storehouse for all time to come from which future students shall draw their material for topical monographs. WILLIAM CHURCHILL.

**British North America, 1763-1867.** By A. Wyatt Tilby. Vol. III: The English People Overseas. vii and 441 pp. Constable & Co., Ltd., London, 1911. 6s. 8 x 6.

This is Vol. III of a series and bears the special title, British North America. It includes three of the so-called books of the series, IX, X, and XI. Book IX bears the rather unhappy title, "The Split of Empire," and traces the story of Canadian affairs from 1763 to 1801. Its chapters relate to the peace of 1763, the constitutional struggle of 1764-1774, the Imperial Civil War, or the American Revolution, the United States of America, and the constitution of Canada. These early chapters, as well as most of what follows, are distinctly historical rather than geographical, and deal much more with political deeds and motives than with the land and man's relation to it. On page 106 is a passage fully recognizing the modifying agency of physical features. Referring to the United States as still containing a part of the English people, it is observed that a change of government may modify the conditions of development, but will probably influence a people "less than the constant operation through several generations of a different climate and a fresh environment."

Book X rehearses the "Call of the West." Here, in the account of the Northwest Passage, of the Hudson's Bay Company, and of the overland movement to the west, the geographer finds himself more at home. To many who look upon the Hudson's Bay Company as the great corporate pioneer of Canada, it is surprising to be told that during the first century of the life of this company it added nothing to geographical knowledge, but, in the alliterative phrase of the author, "concentrated its attention on skins and not on science, on dividends and not on discovery." The call of the west includes that of the north as well, and ten pages are filled with Mackenzie's adventures along his great river. Book XI, "The Birth of the Canadian Nation," is again purely historical and is a short story of the steps that led up to the Union of 1867.

XUM

The work is rather discursive in character and shows a certain lack of unity and coherent structure, though it is doubtless more effective as one of a series than as a single volume. A. P. BRIGHAM.

**The Greatest Street in the World.** The Story of Broadway Old and New, from the Bowling Green to Albany. By Stephen Jenkins. xxii and 509 pp. Maps, ills., index. G. P. Putnam's Sons, New York, 1911. 9 x 6.

The chapters deal in sequence with the Fort and Bowling Green, Broadway to Wall Street, Wall Street to the Commons, the Commons, City Hall Park, from the Park to Canal Street and so on to the concluding pages which tell of Broadway in Columbia and Rensselaer counties. The story tells of the growth and development of the great street. The author has collected a great mass of valuable material, much of it relating to incidents of national importance. The promenade list ranges from the first man who walked down Broadway with a waxed mustache to historical pageants and funerals. The many-sided aspects of such a street touch upon nearly every phase of human activity and the book contains no end of variety. It is rich in historical allusions, and apparently every drama of importance enacted along this highway is here recorded. The illustrations include many from old prints, and many photographs of the present day. ROBERT M. BROWN.

**Beiträge zur Charakteristik der älteren Geschichtsschreiber über Spanisch-Amerika.** Eine biographisch-bibliographische Skizze. Von Friedrich Weber. Beiträge zur Kultur- und Universalgeschichte: No. 14. xi and 338 pp. Index. R. Voigtländers Verlag, Leipzig, 1911. Mk. 10. 9 x 6.

In the complex of territories of diverse settlement which we have united into a nation no inconsiderable area comes to us through Spanish sources. In much of our southern country, in all of our southwest, our title runs back to Spanish deeds. It is, therefore, with no little surprise that we note in this volume the complete absence of discussion of the history of California. The inner southwest, under the title of New Mexico, is dismissed in seven pages; and the Atlantic southeast is summed in six pages given to Florida. It will thus be seen that this volume has little of interest for the historical geographers of the United States. There is an equal failure to deal with the Spanish America south of the Amazon except as the Inca culture on the west coast has attracted the author. With these reductions the work is seen to deal most conspicuously with Mexico and the smaller republics immediately south thereof. In this narrower scope the study is valuable. It is practically a bibliography expanded with biographical detail, and at times critical comment is added. As such it will be found to serve an excellent end as introductory to the study of the historians of Mexican culture. Within the limits of this narrower field the author has been sedulous in collecting the material, some of it by no means generally familiar, and no conspicuous omissions have been discovered. It fills quite satisfactorily an important place as a compendium for Americanists which will spare the student much necessity for research of obscure documents.
WILLIAM CHURCHILL.

## AFRICA

**La Colonisation Française dans l'Afrique du Nord. Algérie-Tunisie-Maroc.** Par Victor Piquet. viii and 538 pp. Maps. Armand Colin, Paris, 1912. Fr. 6. 8 x 5.

With this volume the author has brought to a brilliant conclusion his history of northern Africa. The first volume was published three years earlier and discussed the non-Christian civilizations of the Barbary States as in succession or by delimitation the Berbers, the Arabs and the Turks succeeded in establishing themselves. This was an essential preliminary in Piquet's historical scheme; his end is to present the history of France on the southern shore of the Mediterranean, and it was necessary to set forth the preceding state of barbarism. The second volume, published in 1910 and reissued in a second edition this year, deals with the period of military occupation of the High Barbary by France between 1830 and

XUM

1910. In this final volume, which is sufficiently complete to stand by itself, the author recapitulates his former studies in brief as the proper background upon which to draw his really excellent picture of the present state of the great French colony in Tunisia, Algeria and Morocco. While the author is strongly national and earnest in his belief that these southern shores of the Mediterranean properly belong to his country he has left the diplomatic history almost wholly out of this record. But to those who seek a full story of the civic and social progress of this colonial successor of the Saracen empire this history will be found invaluable.

WILLIAM CHURCHILL.

**Specimens of Bushman Folklore.** Collected by the late W. H. I. Bleek and L. C. Lloyd; edited by the latter. With an Introduction by George McCall Theal. xl and 468 pp. Ills., appendix. George Allen & Co., Ltd., London, 1911. $6.50. 9 x 6.

In these days when any one with a liking for the Marquis of Carabas and Aladdin may apologize for the soundness of his literary taste by calling it interest in folklore we cannot praise too highly the rugged honesty of the material which this volume offers. Folklore is something far more valuable than the mere telling of tales of old wives in the sun. Such tales give us our surest access to the minds of primitive folk, and without this knowledge of the mind and soul of the elemental folk of our kind we are to be forever barred from the truths of social evolution. The collector of such material must put aside all thought of translation into smooth English, transliteration of the thought must be the aim of the conscientious student. Sentences may be sententious till they snap like a whiplash, continuity of the flow of thought may seem lacking, connectives absent; yet these are the very details upon which the careful student is to base his knowledge of the thought method of those to whom the stories are literature.

That is the most salient characteristic of the stories collected in this volume. They have been dealt with honestly, they may be used for more advanced study with whole confidence that they have not been distorted in the record and the rendering. Nor is this all. The senior author, Dr. Bleek, had already won fame by his comparative studies of the Bantu and the Hottentot. The world was awaiting in high expectation a great work of his pen on these tongues. But the poor unknown Bushmen came within his reach, he put aside the enticing prospect, plunged into the hard labor of Bushman studies. This volume is the result, the one authoritative record of this pygmy people whom some regard as the persistent survival of palæolithic man. The sacrifice he made was great. This volume should have been his reward; it stands as his monument. W. C.

**Tripolitania e Cirenaica dal Mediterraneo al Sahara.** Monografia Storico-Geografica. By Arcangelo Ghisleri. 198 pp. Maps, ills. Società Editoriale Italiana Istituto Italiano d'Arti Grafiche, Milano-Bergamo, 1912. 10½ x 8.

This is an excellent monograph which, though elementary in scope, covers the salient facts of our knowledge of the region. A short historical sketch precedes the geographical notes that comprise the main part of the work. The reader is enabled to determine the relative importance of Tripoli from the days of roving Phœnicians, five centuries B. C. at least, to the present military operations of the Italians. The author evidently took particular pains to mention the work of modern explorers, although not in the form of a continuous record. These notes, in fact, are dispersed throughout the text.

In the second and third parts, the general geography of Tripolitania is reviewed. The description is accompanied by anthropogeographic notes of value. The coastal region is treated with much detail. The author says that no mountain chain properly so called exists in the former vilayet of Tripoli and that the mountains which were supposed to extend from east to west across this territory were only a series of sand dunes which explorers proceeding from north to south had erroneously regarded as the foothills of a southern chain. The book ends with a description of the deserts and oases of the hinterland. A list of the main caravan routes is appended. Some good maps and many photo-engravings illustrate the book.

LEON DOMINIAN.

**About Algeria, Algiers, Tlemçen, Constantine, Biskra, Timgad.** By Charles Thomas-Stanford. 302 pp. Map, ills., index. John Lane Co., New York, 1912. $1.50. 7½ x 5½.

The author is a wide-awake traveler who made a rapid trip through these parts of North Africa in a motor-car. He gleaned many things of interest to anyone who contemplates a similar visit. Many picturesque glimpses of Algeria are presented in a rather rambling and original style of writing. The chapters on the "Alluring Oasis" and the "Sahara" are the best. The former is inspired chiefly by Biskra, which the author christens "Hichenstown," and the latter by the vastness of the waste which makes up over ninety per cent. of Algeria. In Timgad of the desert, a city destroyed some twelve centuries ago, interesting and impressive structures have been unearthed, and among these is a Roman library "bequeathed by Marcus Julius Quintianus Flavus Rogatianus, of senatorial memory," whom the author dubs a "Roman Carnegie." Throughout the narrative stories of invasions, historical incidents and descriptions of peoples and customs are interspersed. ROBERT M. BROWN.

**Man and Beast in Eastern Ethiopia.** From Observations made in British East Africa, Uganda, and the Sudan. By J. Bland-Sutton. xii and 419 pp. Ills., index. The Macmillan Co., New York, 1911. $4. 9 x 6.

This readable book is a running comment upon travels in British East Africa, Uganda, and the Sudan. All travelers have a bias for one thing or another, and Mr. Bland-Sutton has devoted a large portion of his book to animals, especially birds. These descriptions are in no sense technical but are what would be expected from an observant traveler who is especially interested in animal life. The descriptions of the various tribes encountered in the travels are interesting. Their habits, food, social customs and other features are described as the author saw them.

Two chapters have especial interest for students of earth science. One chapter deals with the great Rift Valley of Africa. This trench, a relatively narrow downthrow fault block, has sides so steep that "the traveler may suddenly come to the edge * * * and run a risk of tumbling over." The sunken block is itself broken, giving a series of fault escarpments on the valley floor. Chapters are given to the interesting extinct volcanoes of the region of which a few are described. The scarcity of helpful maps is somewhat annoying. F. V. EMERSON.

## ASIA

**La Géologie et les Richesses Minérales de l'Asie.** Historique—Industrie—Production—Avenir—Métallogénie. Par L. de Launay. 816 pp. Maps, index. Ch. Béranger, Paris, 1911. Fr. 35. 9½ x 6½.

In order properly to judge this book one ought to know the earlier work of the same author on the Mineral Wealth of Africa of which this is a continuation. The author's purpose is to establish a connection between the geological structure of the Asiatic continent and the occurrences of minerals, and he designates this special line of work by the term "metallogenics." This name does not appear adequate, and it is not easy to understand why the seemingly more appropriate name of mineralogenics was not chosen; for it is the genesis of minerals in general, not of metals alone, which the author investigates. Therefore, the words metalliferous, metalogenic, etc., must in most places be understood as mineral-bearing, or mineral-forming, etc.

The author tries to throw light on isolated local mineral occurrences by means of general ideas founded on the synthetic study of large areas. He wishes to determine the relation between the mineral-bearing strata of a country and the whole of its tectonics, and again the relation of the latter to certain geological processes, the ages of which must be ascertained as accurately as possible. In this way the "metalliferous" strata are studied, as it were, in their environment, and Asia is an especially favorable object for such studies for two reasons: first, because it shows very clearly the contrast between the metals

formed at great depths by geological pressure, and the more superficial incrustations in fissures; secondly, because it illustrates to perfection the effects of the continental extent of those processes. In this way the author finds it possible to establish "metalliferous" provinces and to describe their regional aspects and determine their relations with certain geological phenomena. The age of the later being known in most cases, that of the minerals, too, may be determined with tolerable accuracy.

The first part contains the economic and industrial facts; it describes the past, present, and future, of mining industries in Asia. The second part is given over to "metallogenics," *e. g.* "the genesis of useful minerals" (p. 4). It consists of a general and a special part: the former is mainly geological, including a geological history of Asia, a division of Asia into great natural "provinces" with individual conditions of folding, dislocations, igneous intrusions, metamorphism, and erosion, as well as sedimentation. The latter part is subdivided into two parts again, corresponding to the fundamental difference in "metallogenic" processes: igneous or hydrothermal processes, which account for almost all the metal-bearing strata, and sedimentary action, which produces salt, etc.

The *leitmotiv* of the book is to show that the "metalliferous" strata of one and the same "province" exhibit common characteristics, owing especially to the medium depth at which crystallization took place, and how these conditions have a tendency to repeat themselves in other provinces of similar nature. Four types of such "metallogenic" provinces are distinguished:

1. The first type may be explained by imagining a zone of rock crystallized at from ten to thirty kilometers below the surface. The product would be some kind of granitic rock surrounded by metamorphic gneisses. This type will be exposed to view wherever the land is worn down low enough, and its best examples in Asia are the Angara Plateau in Siberia, Gondwana area in India, the Sinian bathylith in Korea-Pechili, etc. In these "provinces" are found two types of "metallization," both characteristic for great depths: igneous impregnations, which elsewhere appear in large masses, appear here interstratified as very small veins among the layers of schistose rocks, and they are accompanied by gold, copper, and nickel.

2. At a somewhat higher level within the earth's crust there is an abundance of granulites (the author gives no definition of what he understands by that much discussed name), fine-grained granulites, and micro-granulites which higher up pass into diabases, porphyrites, etc. These three groups have a tendency to form dikes and veins rather than homogeneous masses, and are especially well formed in the so-called Hercynian chains of which the Ural and Altai Ranges, Indo-China, and Malacca are the best Asiatic examples. The massive granulites contain tin as a rule, the fine-grained ones; antimony, the micro-granulites; lead, zinc, copper.

3. Still higher in the crust is the region of the third "province." It lies probably at the base of the recently folded chains, and is a zone rich in dislocations which are not necessarily connected with the folding processes, but have occasionally broken the already existing folds. Along the fault-lines, eruptions of andesites and trachytes have taken place. These provinces are rich in minerals: gold, silver, copper, quartz, especially in North America. In Asia the Colorado type is repeated in Japan, and partly also in Armenia and the Anti-Caucasus.

4. The fourth "province" corresponds to the folded chains proper, in which tectonic forces play only a subordinate part. They are characterized by the almost complete absence of minerals, such as the Jura Mts. in France, and the northeastern Caucasus and certain parts of the Himalayas represent it in Asia.

No important mineral deposit has been produced by an active volcano. Wherever minerals are found in zones of recent volcanic activity, they date from an earlier period. The "metalliferous" zones always have their origin at the greater depths, and in many cases the age of a chain is not that of the formation of the minerals it contains, because it is not the process of folding but that of dislocation which produced the latter. The book is profusely illustrated with maps and diagrams, and two indices, one each of subjects and of geographical names, greatly facilitate its use. M. K. GENTHE.

**Le Peuple Japonais.** Le Vieux Japon—Le Japon Moderne—Le Japon Actuel. Par Jules Arnoux. 510 pp. Marcel Rivière et Cie, Paris, 1912. Fr. 5. 7½ x 5.

The theme here is the change which Japan has been undergoing, but the author does not regard it as a distinctively modern phenomenon associated with enforced contact with the Occident. He finds it in progress in far more remote periods, in distant ages he finds Japanese impermanence in striking contrast with the age-long immobility of China and of Asia in general. In explication of his theme he cites the saying of the Japanese immediately after the late war: "When we were artists and philosophers you treated us as savages; we had to win the battle of Mukden and slay a hundred thousand Russians to show the world that we are civilized." It is a bitter arraignment, part specious, part real. Elsewhere he quotes the speech of a young Chinese at the Congress of Lucerne in 1906:

"We were a peaceful people, what have you made of us? Not only do you force us to defend ourselves, you are making us as savage as yourselves."

Such an attitude can lead to no good results in the history of race development, for the sting of epigram lies in the impossibility of confuting its half truths. The study of modern Japan is to be conducted with full recognition of the new burdens which it has assumed, of the new relations upon which it has entered. There cannot be adduced, in this work there is not adduced, any evidence that any contest for the hegemony of Asia is predestined to engage China and Japan in a monster struggle; still less is there evidence that Japan will advance to imperial aggrandizement upon the Pacific at the expense of Europe and the United States. We no longer have to deal with the Japan of the tea gardens and the cherry blossom festivals, but on the other hand, we see no reason to regard with suspicion a small and experimental nation. The author seems far too alarmist. WILLIAM CHURCHILL.

**Ruins of Desert Cathay.** Personal Narrative of Explorations in Central Asia and Westernmost China. By M. Aurel Stein. Vol. I, xxxviii and 546 pp. Vol. 2, xxi and 517 pp. Maps,* ills. Macmillan & Co., Ltd., London, 1912. $12.50 for 2 vols. 9½ x 7, each.

The two portly volumes of this record of exploration in the deserts of inner Asia are so crowded with material that a synoptical syllabus may be found of value. First we delimit the geography covered in these years of difficult wandering. Dr. Stein, already fitted for such service by earlier familiarity with the conditions to be met with on the arid side of the Himalayas and with a close examination of Khotan to his credit, left India by the northwest gate through the Swat valley and reached Kashgar by way of the Afghan Wakhan. Thence bending his way eastward, he threaded the Lop-nor with excursions into the desert of Gobi, passed through the New Dominion of Chinese Turkestan, reached An-hsi and the Great Wall and entered the Chinese Empire from the west, made a reconnaissance of the mountain chains of Nan-Shan, and re-entered India by way of Ladakh.

Not till the very end of these brilliant journeys did the glaciers of the Nan-Shan exact the toll of frozen toes which must be paid by those who would conquer the realms of everlasting ice. He had able assistance of that wonderful corps of Indians who have become well-trained geographers in the trigonometrical survey, whose headquarters are at Dehra-Dun, but whose pundits in all sorts of disguises have threaded the recesses of Central Asia. The record of the exploration is, therefore, supported by a series of excellent maps in which theodolite and plane table have carried the determination of position sheer across the greatest width of India.

The contribution to physical geography is two-fold, mountain and desert. In the former Dr. Stein is at his best. We are made to feel that mountain climbing is to him a joy, his description of alp and glacier is precise and enthusiastic. All the more is our pity that the ice nipped him before letting him go. In the desert, in Lop-nor and Gobi, in the struggling oases, he has

* Copies of these maps listed under "Central Asia" in *Bull.*, Vol. 43, 1911, p. 392.

XUM

given sedulous attention to the problems of desiccation, of æolian formation and the deposit of the loess.

With general ethnology his narrative deals very slightly, yet here and there we find hints that he was careful to collect anthropometrical data for examination by other students who might handle the material which he has brought out of the unknown. His archæological examination, however, has been as thorough as extensive. He has discovered many seats of culture buried under the dunes which have overwhelmed the former civilization of that region and in many cases has succeeded in establishing at least one and sometimes both limiting dates. He has surveyed the outer lines of the Chinese Empire, laying bare the desert wall and its watch towers by which China fought back those wild tribes who thence were driven to harry the western world as the fierce Huns under the leadership of Attila, God's Scourge. He has identified the great overland trail along which the slow camel trains carried silk to deck the pomp of imperial Rome; at one of its stations he found a bolt of yellow silk which had been left behind when saddling up. We can imagine the lash or worse which was the reward of the careless camel driver close on 2,000 years ago.

His contributions to philology surpass all measure of value. He has unearthed inscribed billets of wood with carefully stated dates, some of them going back before the Christian era. The sands of that rainless region have preserved for his mattock invaluable scraps of paper, of palm leaves brought from afar, of shavings, each carrying some legend. These finds would be enough to bring him fame, but more has come. At Tun-Huang, in the shrines of the Thousand Buddhas, he collated a temple library, in barbarian measure "seven cartloads," and of these cartloads he has succeeded in bringing back to the British Museum 14,000 manuscripts which will engage special students for yet many a year of enthusiastic research. Included in this find are sacred texts in ancient Chinese, in Tibetan, in Kharoshthi, in Indian Brahmi, in Gupta. In Sanskrit he brought back the most ancient manuscript known. He discovered a complete religious treatise in the "southern unknown language," of which his earlier researches in Khotan had revealed a few fragments, and in this later discovery he has given science the bilingual with which that unknown speech can be studied and established. Another of his finds yields us the first authentic text of the great "confession" of the Manichæans, that religion of western Asia which blocked so long the movement of Christianity eastward until at last the two warring faiths were whelmed in the advance of the tide of Mohammedanism.

This is but the briefest synopsis of the more salient matters which engage and hold the attention in this monumental work. After this there is little space left for review, for critical comment further than is suggested by the note of the great discoveries. It is a major work of learning. The true review of such work can come only after years when the special students have adjusted this wealth of material each within the scope of his own study. Then it will surely appear that this work of Mark Aurel Stein is fundamental in the disquisitions of half a dozen sciences. WILLIAM CHURCHILL.

**Half a Century in China.** Recollections and Observations. By the Venerable Arthur Evans Moule. xii and 337 pp. Map, ills., index. Hodder & Stoughton, London, 1911. George H. Doran, New York Agents. 7s. 6d. 9 x 5½.

The author proposes to give no more than the recollections and observations of his half century of striving to open the Chinese heart. That is no mean achievement. Not to all men is given the sight which must underlie observation, and very few are those who can recall the things which are worth the memory. But in these simple pages we may see in the writer a sweet nature which gave itself in sympathy to the alien and ancient culture which he sought to serve, and by a divine compensation for his gift of himself, received sympathy in return. What it was given to Archdeacon Moule to see after he had won the confidence of the people has filled him with respect and admiration, even with a full measure of affection for the Chinese character. There is little in these papers which will advance the geographer's knowledge of mid-China; still the author gives pictures of Ningpo and the countryside which are likely to

prove as valuable as they are agreeably drawn. With sober anxiety he looks forward to the remaking of millennial China, but his expectation is not without hope. So long as the great conservative mass of the Chinese holds to its belief in and its practice of the fundamental virtues of education, civility and probity which have caused the empire to endure through the utmost ages, so long as this continues he foresees a great state awakening out of the sleep of the weakened dynasty. WILLIAM CHURCHILL.

**Les Royaumes des Neiges (États Himalayens).** Par Charles-Eudes Bonin. x and 306 pp. 3 maps,* ills. Armand Colin, Paris, 1911. Fr. 4. 7½ x 5.

The work is introduced by a note wherein pardonable pride somewhat exaggerates the absence of record of the Himalayan kingdoms and their people. It will at once be recalled that this was the region wherein Sven Hedin prosecuted arduous research to brilliant success; and for many years the sedulously anonymous pundits of the Indian survey have penetrated to the most remote valleys within the snows. Therefore it is not exactly true to say that this work fills a lacuna in geographical knowledge. The author covers the whole mountain tract from Afghanistan to the boundary line between China and Tibet in such a comprehensive survey as must be the result of his fifteen years of exploration. Yet after the correction of this misstatement there remains to Bonin's credit sufficient record of priority in the uncovering of the hidden recesses of the Lolo and the Mosso, whose territory he was the first to cross in connection with a mission which carried him to their capital of Likiang-fu or Sdam, Chinese and Tibetan designations respectively. After careful consideration of the people as they passed under his examination and from extended study of fragments of their literary product he determines their assignment to Tibetan stock and authorizes their removal from affiliation with the Chinese to which on earlier and imperfect information they were assigned. It must be said that in parts the work is trivial, yet it is throughout interesting and a most attractive narrative of a region of the world which was long believed to be the cradle of the most important branch of the human family. His chapters on Bhutan and Assam are replete with interest, a valuable compend of information by no means easy of access elsewhere and all animated by the zest of his own familiarity with the region. WILLIAM CHURCHILL.

**The Economic Transition in India.** By Sir Theodore Morison. 251 pp. Index. John Murray, London, 1911. 5s. 8 x 5½.

This work is happily free from the vice which characterizes many similar studies, the looseness of articulation arising from presentation of a series of lectures in academic courses. With abundance of administrative experience behind him, Sir Theodore in his earlier book took rank as an economic authority. Thus he has acquired the sureness of touch which can be found only with those who have found themselves masters of their subjects. In this study, he does not put footnote clogs upon the march of his theme; it is always fair to assume that the beginner must take his author upon faith, and the more advanced investigator will already have collated the pertinent material. It results, then, that we have in this study of India in transformation a remarkably valuable work in the most simple presentation.

The basic idea of this research is to present the fact that in India, now seething in economic unrest, the problems are not Hindi or Mahratta, not Rajput or Bengali, but universal in their strike. To the perplexed administrator there is offered nothing new. India suffers to-day under the same problems as Europe suffered in the slow course of emergence out of the middle ages. The gist of it is that archaic culture is based upon the village community, self-supporting and self-centered, an economic unit. Modern culture is diffuse, it draws from all and distributes that which it draws, its economy is no longer parochial, it is scarcely dammed at state and imperial boundary lines. The

* Copies of two listed under "Tibet" in *Bull.*, Vol. 43, 1911, p. 879; the third under "Tibet-Burma, etc." in vol. 44, No. 5, p. 400.

XUM

author wisely sets forth that means of transportation is the key of the transition. The map of mediæval Europe shows at a glance that civilization followed the great Roman roads. We should see that the problem of to-day in India must be the problem of to-morrow in our East, the Philippine province. In its transition from village culture to the wider place which we must force upon it, it might be well for our untrained administrators to study this valuable treatise.

WILLIAM CHURCHILL.

## AUSTRALASIA AND POLYNESIA

**Murihiku and the Southern Islands.** A History of the West Coast Sounds, Foveaux Strait, Stewart Island, the Snares, Bounty, Antipodes, Auckland, Campbell and Macquarie Islands from 1770 to 1829. By Robert McNab. xiii and 377 pp. Map, index. William Smith, Invercargill, N. Z., 1907. 8½ x 6.

This is a work in South New Zealand history. The author is a member of the House of Representatives and also Minister of Lands and Agriculture for New Zealand. The book marks an effort to recover an obscure early history in which the discoverers Cook, Vancouver, and Malaspina had a part. The motive under which succeeding events took place lay in trade in the seal and in flax, oil, and timber.

The search for material led to obscure documents in English and to untranslated papers in Spanish, French, and Russian. After the records of New Zealand and Australia were exhausted, search was made in the annals of Salem, Boston, New Bedford, Nantucket, Providence, Baltimore and other American ports whose whalers and sealers had plied their business in this remote region. The British Museum, Paris, Madrid, and St. Petersburg made their contribution. In the Essex Institute of Salem was unearthed the log of the *Endeavour,* the *Britannia,* and the *Providence,* of the last decade of the Eighteenth Century, made possible as a single manuscript by the fact that a Mr. Robert Murray was in succession an officer of the three ships and carried one log for all. The narrative of the region is brought down to 1829.

Murihiku is Maori for the *last joint of the tail,* and was given as a name to the south part of the South Island of New Zealand. Some of the small southern islands considered are remote, as Auckland, Campbell, Antipodes, and Bounty Islands. The general map which precedes the text is unfortunate in a degree of reduction which renders many names almost illegible. The same is true, in lesser degree, of the map of Murihiku and Stewart Island, opposite page 16.

The text includes twenty-four chapters, and five appendices. It is not intended as finished history, but brings together original material as a source for the historian. The author is perhaps too modest, however, for the story, though given in the detail of the annalist, is full of fascination for the geographer and for the general reader. The appendices include,—Cook's *Endeavour* Controversy, Menzie's Journal, Log of the *Britannia,* Log of the *Endeavour,* and Captain Kelly's Evidence. The index is full, consisting of twenty-five double-column pages, and each chapter closes with a list of references.

A. P. BRIGHAM.

**Through Polynesia and Papua.** Wanderings with a Camera in Southern Seas. By Frank Burnett. xv. and 197 pp. Maps, ills., appendix. Francis Griffiths, London, 1911. 12s. 6d. 9 x 6.

**Islands of Enchantment.** Many-Sided Melanesia. Seen Through Many Eyes, and Recorded by Florence Coombe. xxvii and 382 pp. Map, ills., index. Macmillan & Co., Ltd., London, 1911. 9 x 6.

It serves an end most satisfactory to the student to bring together into one notice two volumes utterly dissimilar, yet each covering, in the interlacing of the areas which their chords respectively subtend, much of the same little known region, much of the same life still less comprehended. A worthy book of the Western Pacific one of these is, the other wholly unworthy. If there were not a

valid reason subsisting exterior to the ignorance in all things and the malice in many things which characterize Mr. Burnett's book I should be loath to mention it at all.

The external reason is this. We have very scant information as to Melanesia. It remains in that stage of knowledge in which anything which purports to give information needs proper characterization. At times it is as necessary to condemn as at others it is pleasure to commend. This surely is such a case and in this case whatever value may attach to the signature lies in the fact that the writer is a specialist upon the South Sea through his own choice and through long years of exploration and administration.

The Polynesia of Mr. Burnett is Tahiti and Rarotonga, at present the voyage of the cheap tripper in the nearer Pacific. How well he has dealt with these well-known and carefully studied islands appears in text and illustration. In his plates he presents not once or twice but several times the islanders in poses which to them are as meretricious as to our way of thought shameless. The quality of his text may be discovered in the fact that not even by accident of typography has he once spelled the name of Rarotonga correctly. The greater part of his volume, that part in which the greater interest should properly lie, engages the Solomon Islands. He opens the vials of his abuse upon the only two classes of better men who have at heart the betterment of these wild islands of savagery as yet at its fiercest, the missionary and the British administrators. He accepts with unquestioning faith the wildest statement of the traders and beachcombers. It is unsafe that such work should pass into incautious hands. It calls for a profound acquaintance with the Solomons to read it properly; yet for several of the islands this misleading book contains the first account since the days of the great voyages of exploration.

The other volume is a record of amelioration, for the author is associated with the Melanesian Mission of the Church of England with headquarters on Norfolk Island. She made a trip on the mission steamer *Southern Cross* from island to island where it was necessary to leave supplies or to visit the struggling mission stations. One may honestly hold some doubt as to the efficacy of missions among these savages; such doubt is far remote from such wholesale misinterpretation of their work as fills Mr. Burnett's pages. But it must be acknowledged that their work has produced the result already mentioned, amelioration. This is very familiar ground to me. Not quite thirty years ago a visit to most of the islands of which the enchantment holds the writer of this volume called for arms, arms in readiness and more than once in use. Yet last year a woman went from island to island and had but a pleasant trip, surely a marvelous change. Wherever she went she was well received, she made friends with the islanders, she won the shy women to the little interchanges of kindness which count for so much in savagery.

Though it covers a not inconsiderable area, from the northern New Hebrides to the central Solomons, the work is wholly unpretentious. The author does not aim to go deeply into the discovery-history or the present social condition of any one of the twenty-five islands at which she touched. On the contrary, she tells but what she saw on her landing, scarcely touches upon the experiences of the missionaries in whose party she was. It results that she has given new descriptions of all these islands, most of which have been hitherto most imperfectly described. In many cases she has supplemented her own eyesight by the always pleasing record of some characteristic tale of the island store of legend. In such cases she has drawn upon the classic work of Prebendary Codrington; the value of such draft suffers no loss by being placed in juxtaposition beside the natural scenes in which the myth arose.

With one detail we may find fault, geographically a fault to be reprehended. It will readily be understood that geographical nomenclature in Melanesia is as yet not satisfactorily established. In the imperfect longitude determinations of early voyages, the same holding true until quite recent times, synonymy has arisen; for instance, in the Solomons Ulawa is La Treguada of Mendaña, La Contrariété of Surville, Smith's Island of Lieutenant Ball. At present the attempt is making to designate the islands by their indigenous name, or, in the frequent case that they are not known by a name as islands, to employ some name which is at least in some sort of use in the vernacular and which may be ex-

XUM

tended to the island as a whole without violence to local usage. This has been carefully worked out by Prebendary Codrington, the great authority upon Melanesian speech, and while his practice has not been altogether consistent he has at least provided the material for consistency. In dealing with this very problem in a major work within this field I was sedulous to adopt the consistency which Dr. Codrington suggested even when he did not practice it. This author reverts to a still earlier usage, thus complicating the record. Two examples will serve for citation. The island which she writes of as Raga is really Arag, Codrington says ("Melanesian Languages," p. 431) "the native name is A Rag"; of her Ureparapara the same authority says (page 384) "the native name of Bligh Island, commonly called Ureparapara, is Norbarbar, the place of slopes." Of much the same nature is her consistent use of Q without explanation in the spelling of Melanesian names. We can readily imagine the struggles of her readers to deal with Qat, who appears in many of the myths. It is rather too much to expect in the general public such Melanesian scholarship as should know at once that Qat is not in the least Quat, but that this arbitrary consonant device varies from island to island and the puzzling name at its simplest is really pronounced Pwat and at its most complex may be the highly agreeable Nggmbwat, a whole mouthful.

The Melanesian library is not yet large, accretion is but slow. It is a pleasure to welcome to it these "Islands of Enchantment" and it is not too much to say that it will long remain of value for those who wish to make acquaintance with one of the rudest nooks of this earth. WILLIAM CHURCHILL.

## EUROPE

**Undiscovered Russia.** By Stephen Graham. xvi and 337 pp. Maps, ills., index. John Lane Co., New York, 1912. 9 x 6.

This was an excellent opportunity, but the author has been so intent upon mannerism of composition that the opportunity has been all but lost. It is a record of Russian byways, of travel through lanes and along the rivers, all remote from the railways and the route of common tours. Mr. Graham enjoys the intimate touch with the moujik whom he meets along the road or in the tea houses. He enters into their life, their views of faith and government, the two intimately associated in Russia. The picture is as truly peasant as is "The Angelus," but it is plus the vice of vodka, the peasantry of the moujik is sodden with strong drink raging. This is a Russia scantily known. It is well worth the knowledge of those who are waiting for the great empire of the east to come to its own development. Administrative Russia is all German, the Russia known for good and for ill is frankly imitative of the west; but when the peasant ceases to find his pleasure in intoxication, when he develops into the bulwark of the state it will be well to have more of such intimate record of his life as is suggested in these sketches. Mr. Graham's path was from Archangel up the Dwina, with a side ramble to Pinyega on the edge of the tundra. At Kotlas he left this river and traversed the forest land of Vologda through the valleys of the Sukhon and the Yug. At Vetluga he was turned aside by the cholera and finished his tramp at Moscow. The book would have had far more value if the detail of incident and observation had been more distinct. The author seems to have aimed in his text at some sort of harmony with the few drawings by his Russian artist friends which he has included by way of illustration, something impressionistic and not always comprehensible. WILLIAM CHURCHILL.

## POLAR

**A Voyage to the Arctic in the Whaler *Aurora*.** By David Moore Lindsay. ix and 223 pp. Ills., appendix. Dana Estes & Co., Boston, 1911. 8½ x 5½.

The book is largely a transcription from the diary of a voyage made over twenty years ago. The three projects in view were seal hunting, the relief of the Greely Expedition and whaling. The *Aurora*, a Dundee boat, sailed for the Greenland whaling grounds, and while waiting for the ice to disappear, the party

engaged in seal hunting with St. Johns as their base. An account is given of the unrestrained slaughter of seals at that time. The vessel went northward toward the whaling grounds in company with the ships of the Greely relief expedition and hoped to win the prize offered for finding the Greely party. The remainder of the book tells attractively the story of whale fishing.

ROBERT M. BROWN.

## ANTHROPOLOGY

**The Golden Bough.** A Study in Magic and Religion. By J. G. Frazer. Third Edition. Part I: The Magic Art and the Evolution of Kings. Vol. 1, xxxii and 426 pp. Index. 20s. Vol. 2, xi and 417 pp. Part II: Taboo and the Perils of the Soul. xv and 466 pp. Index. Part III: The Dying God. xii and 305 pp. Index. 10s. Macmillan & Co., Ltd., London, 1911. 9 x 6 each.

It sometimes comes to pass, not often, that a work transcends the limits of a mere book, to be reviewed and discussed in the small manner, but becomes an institution. This is eminently the case with "The Golden Bough," and in this light we are to give some consideration to the work, to present to view some of the effect which this work as institution has had upon a group of scientific workers, to note some investigation into the qualifications of the work for the high place which it has long occupied.

In all human probability these volumes now coming from the press are to stand as the final form of this great work. Dr. Frazer has observed a decennial period, the first edition was given to the world in 1890, the second in 1900, and this which bears the date of 1910 is the third. It would be too much to expect a fourth. We now have the half of the full work as it is to be, in fact a little more than the half. Revision and enlargement have been applied to the four volumes which constitute the third edition of the first three parts of the work, the magic art, the taboo, the dying god. Part IV, "Adonis, Attis and Osiris," is to be taken without modification from the general second edition; two concluding parts are now in preparation.

The method which Dr. Frazer has followed, the form in which his conclusions are presented, these are not of his discovery. We have no difficulty in seeing that he has followed on the track of Herbert Spencer, ploddingly rather than with the light step of the enthusiast. In fact "The Data of Religion" might have served him well as a title and have offered opportunity for a delicate recognition of discipleship. Likewise there comes into mind Pliny's great work, the "Historia Naturalis"; this also suggests a model, we shall have to look a trifle closely into the position of Frazer, whether he be nearer Spencer or Pliny.

In any work so encyclopedic we must find an interest in examining the method whereby the directing head of the enterprise, the author, deals with the notes of worldwide reading of himself or others. This implies hacking, a method to which no objection can be raised. A busy worker has just as much privilege to employ diligent readers in his interest as he has the right to permit himself the use of the footnotes in the work of any other author. The critical point arrives when the directing head of the enterprise takes up this raw material and fits it to the plan of his work, the point where the foreman of a research gang takes the higher rank of author. None will deny Herbert Spencer the highest place as author, none would suggest higher than foreman's rank for Pliny. Each of these tireless workers has done up to a certain point what the other has done, each has ransacked the literature of the world for data. Where lies the difference? Pliny has put down in order everything that he could discover, Spencer has weighed his data, has investigated its value, has exercised the prerogative of the editor and the scholar. Is "The Golden Bough" the work of a Spencer or of a Pliny?

In the preface to this third edition Dr. Frazer says that friends have pointed out that certain of his views were anticipated by Hegel; in certifying that this agreement is entirely unexpected he writes "I have never studied the philosopher's writings nor attended to his speculations." Perhaps the English authority does not use the German readily, for this is certainly a most remarkable

XUM

confession to be made by any student of the theory of religion, inconceivable when coming from a leader in such studies.

The conclusions at which Dr. Frazer arrives are based in his research activity, are supported in his publication, by certain data which he has been able to assemble. Each item must rest upon the accuracy of its original reporter, his ability to see the truth, his willingness to record it. These are conditions which the student must regard in every use he is to make of such material. Now it would be quite out of the question for Dr. Frazer to verify each item by his own endeavor, yet in most cases the error of one observer is in no long time corrected by the next in the field; and all the literature is accessible in the Cambridge libraries. Yet Dr. Frazer seems to have taken all the data at their face value, to have made no attempt to correlate them with the general advance in knowledge of the particular subject.

As all this has a most important bearing on the respectability of this great work, I must be very precise in particulars. On page 338 of Taboo he writes "among the Ojebways husbands and wives never mention each other's names" and supports this by a reference to Peter Jones. The spelling Ojebways is unusual. In the very long synonymy of the Chippewa this particular form is found but once, yet Dr. Frazer has not taken the pains to consult the publications of our Bureau of Ethnology. Its "Handbook of the American Indians" had for four years been within his reach. On page 21 of the same volume he cites from Mariner's charming story of Tonga the distinction between the How and the Tooitonga, the civil and the religious king; he has not examined more closely in this matter or he would surely have found that since Mariner, who spelt *ad libitum,* Tongan has been reduced to writing and Hau and Tuitonga (the only forms of record in Baker's dictionary of that language) would never find themselves associable in an index with the forms which he employs. On page 32 of the same volume, and many places elsewhere, he writes of the Minangkabauers of Sumatra; why? Flat ignorance and neglect to examine; he is dependent on a paper written in Dutch, and because Minangkabau, preferably Menangkabau, calls for a termination in Dutch he carries that alien derivative form over into English and thereto adds an equally unnecessary plural termination. On page 117 of Part III he cites from Lisiansky, a century ago, the Hawaiian festival of Macahity; for half that time there has been a Hawaiian dictionary in which he could have seen that the word was Makahiki. On page 381 of the Taboo he shows how a Maori word for knife, *maripi,* goes out of use and is replaced by *nekra;* yet the latter is not a Maori word and never could be, for no Polynesian speech allows combination of consonants.

I should be the last to criticize a great work because of faults in orthography. These are not cited because in each case there is a more modern and approved spelling. They are evidential that there has been no attempt to evaluate the data. Like Pliny, Dr. Frazer has found them, like Pliny he has used them. An encyclopedia has authority only in proportion as its articles have been edited. Here we have evidence that "The Golden Bough" has not been subjected to proper editing of its facts.

Ethnologic study is new to English research. In twenty years "The Golden Bough" has laid all investigation upon a Procrustean bed, all research is conducted along the plans which this work has predetermined. Is that a good thing for a science? It has not proved good in English ethnology. We have each year a larger and larger output, yet there is no freedom in research, there is none of that brilliancy of treatment of facts which marks the ethnologic work of the Germans, none of that almost inspired insight into the culture of savage folk which has appeared in American ethnology.

Already have I drawn attention to a fault in method which is fatal. With respect, I think there is a fatal weakness in the plan of the work. Like causes produce like effects, but we are not entitled to believe in the converse. Given similarity of effect we may not assume the same underlying cause. To establish the great central theme of "The Golden Bough" we should have to believe that there is a homogeneous race of men all under equal impulse toward a common end. In biologic science there is no disposition to restrict the evolution of man to a single focus. The more we know of a savage mind the less we see of unity of thought method.

The literature to which in a score of years "The Golden Bough" has given

rise is a library in itself, wordy battles have been waged, the end is by no means in sight. My intention has not been in the least to add to the polemics, but to renew attention to the work which not only represents but is the best ethnology in England. Yet I should not be true to my own convictions nor should I be dealing honestly with readers, should I neglect this word of judgment. Few books contain so much to interest and to instruct. It is bright and entertaining; but it must be remembered that we cannot accept Dr. Frazer as an authority any higher than the source of his information and that this argument involves the strong probability of a fallacy. WILLIAM CHURCHILL.

## ECONOMIC GEOGRAPHY

**The World's Commercial Progress.** A Descriptive Account of the Economic Plants of the World and of their Commercial Uses. By W. G. Freeman and S. E. Chandler. viii and 391 pp. Maps, ills., index. Ginn & Co., Boston, 1911. $3. 11 x 8½.

This is a notable volume for educational geography. The title would be more exact if it were given as the World's Commercial Plant Products, since materials of a mineral nature and animal products are not included. The authors have drawn upon large stores of information, and one of them writes on the basis of six years of work in economic botany in various tropical countries. The publishers have given the book an attractive and substantial form, in type, illustration, and binding.

Wheat has the leading position and one of the most extended treatments. There is an account of the entire series of processes from tillage to harvesting and manufacture. The other important cereals are then taken, followed by sugar, cacao, tea, coffee, and tobacco. Then come vegetables, fruits, rubber, timber and fibers. The later parts of the volume are devoted to gums, dyes, oils, and spices. The elimination of some minor products makes the work more valuable for common use.

An introduction sets forth the value of plant products, traces the origin of intercourse and exchange among regions, and suggests other principles of commercial geography. Possibly more important than the text are the illustrations, which include hundreds of half-tones showing almost every phase of production and manufacture in all parts of the world. There are also twelve full-page colored plates, showing among other things, wheat threshing, maize, cacao, the tea plant, cotton, tobacco and cinchona. There are full-page maps showing the areas of production. They are subject to the limitations of all such maps, that they are areal rather than quantitative, and thus often fail to reveal the importance of regions. The volume makes generally available a large amount of good material, and offers great help to all instructors in elementary and commercial geography. A. P. BRIGHAM.

## CARTOGRAPHY

**Portolan Charts;** Their Origin and Characteristics: With a Descriptive List of those Belonging to the Hispanic Society of America. By Edward Luther Stevenson, Ph.D. New York, 1911. (Publications of the Hispanic Society of America. No. 82.)

As interest in the study of discovery and historical geography has increased and a better knowledge of the sources acquired, more attention has been paid to the history and value of portolan charts. The literature of the subject has been, comparatively, so meager and so little has been definitely known that they have been regarded as manuscript curiosities ranking with the illuminated missal and the codex rather than as documents which are "the creations of seamen, navigators, explorers and chart-makers who were leaders in the expansion of geographical knowledge which opened the New World regions of Africa, of India and of America."

It is, therefore, gratifying that the first comprehensive work in English on

portolan charts should be illustrated by a description and reproductions of the representative American collection,—that of the Hispanic Society of America. This collection ranks next to that of the British Museum, which is the largest single collection outside of Italy, where, considering their long and continuous service for several centuries, a surprisingly large number are preserved, chiefly in the libraries and museums. That this work has been done by the recognized authority of this country on early cartography makes the account of the origin, character and general development of portolan charts of special value. Dr. Stevenson has accomplished much in original investigation and his works are welcomed as permanent and timely contributions to the study of cartography. This, his latest work, consists of two parts: (1) the history of portolan charts, followed by a bibliography, and (2) a description of the thirty-two charts comprising the collection of the Hispanic Society of America.

In the first part Dr. Stevenson gives a concise and scholarly account of portolan charts and includes a synopsis of the views of Nordenskiöld, Fisher and Fiorini concerning the first charts. As the word "portolan" is a common and confusing misnomer, he draws special attention to the "relationship existing between the ancient periplus, the Italian portolan and the portolan chart of the period of discovery."

He shows how the periplus originated in the accounts of early coast-wise navigation such as the story of Nearchus's Voyages from the Indus to the Euphrates; the Apostle Paul's journey; accounts of special regions; the earliest known and most elaborate periplus, ascribed to Scylax of Caryanda; and later, the so-called Byzantine Stadiasmos, which "may well be considered the most important document known, linking in sense the older Greek periploi with the Italian portolans." He then tells how these accounts of the Greek periploi, with their sailing directions and descriptions of the mainland, were followed in the tenth or eleventh century by the Italian portolan,—a close imitation of the periplus, suggesting the development of this new form from the older Greek. This portolan was, in reality, a harbor book, necessitated by the beginning of commerce between the Mediterranean and European seaports. We are further told how these directions were used for two or three centuries until the portolan chart appeared as a natural as well as necessary development, furthered, probably, by the application of the compass to navigation. This first part of the work is followed by a selected bibliography aiming to include only works bearing directly upon the subject and those of special value. No attempt has been made to include superfluous titles.

The second half of the work consists of the description of the thirty-two charts, together with fifteen photographs of the originals, forming the collection of the Hispanic Society of America.

The value of this collection does not alone depend upon its size but rather upon the history, age, makers, workmanship and state of preservation of the charts. Their history and description is as interesting as their appearance indicates. While many appear to be copies of a common original, it is said no two are alike. The earliest chart in the collection is the one, probably by Giacomo Giroldi, made, as Dr. Stevenson shows by comparison with Giroldi's other work, near the year 1425. This is about 200 years earlier than the oldest portolan chart in the Library of Congress and sixteen years earlier than any in the fine Ayer Collection in the Newberry Library of Chicago.

Other early charts in this collection are those of (2) Petrus Roselli, 1468; (3) Nicolaus de Nicolo, 1470; (4) anonymous chart, late 15th century; (5) Vesconte de Maiolo, 1512; (6) Conde Hoctomanno Freducci, 1524; and so on, up to (32) by Georg Andrea Böckler, 1650.

As an authority on old maps and as a result of his long studies, Dr. Stevenson is able to describe these maps scientifically. He has not been content with the too prevalent form of mere lists of titles, but has fully described and placed each map and has drawn comparisons and conclusions.

So it may be seen that our present day Coast Survey charts, Hydrographic Office charts, Admiralty charts, or by whatever name sailing charts are known in the world's navies, are but the successors to the parchment charts of the fourteenth, fifteenth and sixteenth centuries, made chiefly by Italian and Catalan chart makers until the use of paper and the printing press became general. From that time we may trace successively the growth and expansion of the

portolan chart to the famous Dutch Waggoners, the later Zeekaarten, or Zee-atlas of the Dutch, to the Lightningh Columnes or Sea-mirrours,—to the Neptunes of the French and the Pilots of the English, down to the government charts of to-day.

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This annual publication established its reputation from the first as conceived on an admirable plan giving it special utility. From the great output of geographical books and papers in each year are selected for notice those that seem to the editor and his collaborators to be of particular value and usefulness. The selections are almost invariably made with much discernment, and the compilation is a good index to the best geographical literary products of the year. Critical or descriptive notes are added to each title. The editor has the collaboration in the present volume of fifty-eight assistants. There are 1,165 notes, a few of them including several titles. A number of maps are noted, and many geographers would undoubtedly welcome a small enlargement of the annual to include all the most notable map products of the year.

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XUM

# NEW MAPS

EDITED BY THE ASSISTANT EDITOR

System Followed in Listing Maps.

Title. As on original, if possible. If lacking or incomplete, necessary matter enclosed in brackets.

Scale. Natural (unless otherwise on original). If no scale on original, approximate scale enclosed in brackets.

Coordinates. Approximate limiting coordinates of map given except when region explicitly defined by title. Where map-net lacking, coordinates, if possible of determination, given in brackets. All meridians referred to Greenwich. If map not oriented N., orientation given.

Colors. Number of tints of separate symbols, not number of color printings given. Black or basal color not considered a color.

Source. If map separately published, name of institution issuing it, place and date given. If a supplement, title of paper or book, author, periodical, volume, number, year and pages given.

Comment. Descriptive and critical. In brackets.

Regional Classification. Major political divisions the unit, as a rule, except for United States and Canada. Boundaries of continents according to Siever's *Länderkunde*, Kleine Ausgabe.

## MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

### U. S. GEOLOGICAL SURVEY

*Topographic Sheets*

*(Including Combined and Special Topographic Maps)*

*Arizona.* (a) Miami Copper Belt. Surveyed in 1910. 1:12,000. 33°25′0″ - 33°22′40″ N.; 110°56′0″ - 110°52′15″ W. Contour interval 25 ft. Edition of March 1912.

(b) Ray and Vicinity. Surveyed in 1910. 1:12,000. 33°11′32″ - 33°9′28″ N.; 111°1′26″ - 110°58′32″ W. Interval 25 ft. Edit. of Jan. 1912.

*California.* (a) Biggs Quadrangle. Surveyed in 1909-1910. 1:31,680. 39°30′0″ - 39°22′30″ N.; 121°45′0″ - 121°37′30″ W. Interval 5 ft. Edit. of April 1912.

(b) Butte City Quad. Surveyed in 1909-1910. 1:31,680. 39°30′0″ - 39°22′30″ N.; 122°0′0″ - 121°52′30″ W. Interval 5 ft. Edit. of March 1912.

(c) Clear Creek Quad. Surveyed in 1910. 1:31,680. 39°45′0″ - 39°37′30″ N.; 121°45′0″ - 121°36′30″ W. Interval 5 ft. Edit. of Feb. 1912.

[Northeastern half of sheet is blank.]

(d) Gridley Quad. Surveyed in 1909-1910. 1:31,680. 39°22′30″ - 39°15′0″ N.; 121°45′0″ - 121°37′30″ W. Interval 5 ft. Edit. of March 1912.

(e) Honcut Quad. Surveyed in 1909-1910. 1:31,680. 39°22′30″ - 39°15′0″ N.; 121°37′30″ - 121°30′0″ W. Interval 5 ft. Edit. of Jan. 1912.

(f) Meridian Quad. Surveyed in 1905 and 1909-1910. 1:31,680. 39°15′0″ - 39°7′30″ N.; 122°0′0″ - 121°52′30″ W. Interval 5 ft. Edit. of April 1912.

(g) Mt. Goddard Quad. Surveyed in 1907-1909. 1:125,000. 37°30′ -37°0′ N.; 119°0′ - 118°30′ W. Interval 100 ft. Edit. of Jan. 1912.

(h) Randsburg Quad. Surveyed in 1900. Culture revised in 1911. 1:62,500. 35°30′ - 35°15′ N.; 117°45′ - 117°30′ W. Interval 50 ft. Edit. of Feb. 1912.

(i) Sanborn Slough Quad. Surveyed in 1909-1910. 1:31,680. 39°22′30″ - 39°15′0″ N.; 122°0′0″ - 121°52′30″ W. Interval 5 ft. Edit. of Dec. 1911.

(j) Tisdale Weir Quad. Surveyed in 1905 and 1909-1910. 1:31,680. 39°7′30″ - 39°0′0″ N.; 121°52′30″ - 121°45′0″ W. Interval 5 ft. Edit. of Feb. 1912.

[Maps (a-f) and (i-j) belong to the series of half-inch-to-the-mile maps of the Sacramento Valley.]

*Colorado.* Creede and Vicinity. Surveyed in 1910. 1:24,000. 37°56′ - 37°50′ N.; 106°59′ - 106°54′ W. Interval 50 ft. Edit. of Feb. 1912.

*Georgia.* Milledgeville Quad. Surveyed in 1909. 1:62,500. 33°15′ - 33°0′ N.; 83°15′ - 83°0′ W. Interval 20 ft. Edit. of Feb. 1912.

*Illinois.* New Athens Quad. Surveyed in 1908-1909. 1:62,500. 38°30′ - 38°15′ N.; 90°0′ - 89°45′ W. Interval 20 ft. Edit. of March 1912.

*Kentucky-Indiana.* Kosmosdale Quad. Surveyed in 1905, 1908, 1909, and 1910. 1:62,500. 38°15′ - 38°0′ N.; 86°0′ - 85°45′ W. Interval 20 ft. Edit. of April 1912.

[Northeast corner of sheet includes southwestern part of Louisville.]

*Michigan.* Mason Quad. Surveyed in 1908-1909. 1:62,500. 42°45′ -42°30′ N.; 84°30′ - 84°15′ W. Interval 20 ft. Edit. of Dec. 1911.

*Missouri.* Rolla Quad. Surveyed in 1908-1909. 1:62,500. 38°0′ - 37°45′ N.; 92°0′ - 91°45′ W. Interval 20 ft. Edit. of Jan. 1912.

*Montana.* Cut Bank Quad. Surveyed in 1907 and 1909. 1:125,000. 49°0′ - 48°30′ N.; 112°30′ - 112°0′ W. Interval 20 ft. Edit. of Jan. 1912.

*New York.* (a) Delhi Quad. Surveyed in 1907-1909. 1:62,500. 42°30′ - 42°15′ N.; 75°0′ - 74°45′ W. Interval 20 ft. Edit. of Dec. 1911.

(b) Hartwick Quad. Surveyed in 1909-1910. 1:62,500. 42°45′ - 42°30′ N; 75°15′ - 75°0′ W. Interval 20 ft. Edit. of March 1912.

(c) Ontario Beach Quad. Surveyed in 1894. Culture revised in 1911. 1:62,500. 43°30′ - 43°15′ N.; 77°45′ - 77°30′ W. Interval 20 ft. Edit. of Feb. 1912.

(d) Rochester Quad. Surveyed in 1893. Culture revised in 1911. 1:62,500. 43°15′ - 43°0′ N.; 77°45′ - 77°30′ W. Interval 20 ft. Edit. of Feb. 1912.

(e) Rochester Special Map. Culture revised in 1911. Surveyed in 1893-94. Culture revised in 1911. 1:62,500. 43°20′ - 43°5′ N.; 77°45′ - 77°30′ W. Interval 20 ft. Edit. of March 1912.

[Although not stated in legend, for elevations below 300 ft. the contour interval is 100 ft. on maps (c), (d) and (e). Map (e) a sheet of regular size combined from northern two-thirds of Rochester and southern one-third of Ontario Beach sheets.]

*Ohio.* (a) Caldwell Quad. Surveyed in 1908-1909. 1:62,500. 39°45′ - 39°30′ N.; 81°45′ - 81°30′ W. Interval 20 ft. Edit. of April 1912.

(b) Cambridge Quad. Surveyed in 1907-1909. 1:62,500. 40°15′ - 40°0′ N.; 81°45′ - 81°30′ W. Interval 20 ft. Edit. of Jan. 1912.

(c) Canal Dover Quad. Surveyed in 1909-1910. 1:62,500. 40°45′ - 40°30′ N.; 81°30′ - 81°15′ W. Interval 20 ft. Edit. of March 1912.

*Tennessee-North Carolina.* Mt. Guyot Quad. Surveyed in 1883-1885 and 1891. Partial revision in 1898, 1906, and 1909-1910. 1:125,000. 36°0′ - 35°30′ N.; 83°30′ - 83°0′ W. Interval 100 ft. Edit. of Jan. 1912.

*West Virginia-Virginia.* Pocahontas Special Quad. Surveyed in 1909. 1:62,500. 37°30′ - 37°15′ N.; 81°30′ - 81°15′ W. Interval 50 ft. Edit. of Dec. 1911.

[Embraces the region shown on the northwest quarter of the regular Pocahontas sheet on twice as large a scale as on that sheet.]

*West Virginia-Virginia-Kentucky.* Gilbert Quad. Surveyed in 1909. 1:62,500. 37°45′ - 37°30′ N.; 82°0′ - 81°45′ W. Interval 50 ft. Edit. of Jan. 1912.

*Wyoming-Montana-Idaho.* Topographic Map of the Yellowstone National Park, Wyoming-Montana-Idaho. Surveyed in 1883-85. Partial revision in 1910. 1:125,000. 45°2′0″ - 44°8′20″ N.; 111°6′ - 110°0′ W. Interval 100 ft. Edit. of Jan. 1912.

[Welcome new edition of the special map of the park. Telegraph and telephone lines and outposts shown in red.]

### *Maps Accompanying Publications*

ALABAMA. (a) Sketch map of northwestern Alabama, showing location of area mapped in the Fayette gas field, the general structure of the region, and the northern and eastern extent of the Pennsylvanian series, in which the gas is found. [1:1,600,000.] [35° - 33° N.; 88°20′ - 86°27′ W.].

(b) Map of Fayette District, Alabama, showing structure on the coal horizon of the Clear Creek and Deadwater sections. 1:31,680. [33°43′ - 33°37′ N.; 87°52′ - 87°38′ W.].

Fig. 1 and Pl. VI, "The Fayette Gas Field, Alabama" by C. H. Wegemann, *Bull. 471-A,* 1912, pp. 26-51.

CALIFORNIA. Reconnaissance [Geologic] Map of the Southern End of the San Joaquin Valley, California. 1:500,000. 36°2′ - 34°50′ N.; 119°30′ - 118°36′ W. Pl. IX, "Preliminary Report on the Geology and Possible Oil Resources of the South End of the San Joaquin Valley, Cal." by R. Anderson, *Bull. 471-A,* 1912, pp. 102-132.

CONNECTICUT. Preliminary Geologic and Economic Map of Connecticut. 1:500,000. 8 colors. Pl. I, "The Granites of Connecticut" by T. N. Dale and H. E. Gregory, *Bull. 484,* 1911.

[Not a geologic map of the state but a map showing the distribution of

granites and gneisses. For preliminary geologic map of Connecticut on which this map is based see under "Connecticut," *Bull. Amer. Geogr. Soc.*, Vol. 43, 1911, p. 954.]

KENTUCKY. Map of the Campton Oil Field, Wolfe County, Kentucky. October 1909. [1:24,000.] [37°44′ N. and 83°33′ W.]. With: [geologic] Index map of eastern Kentucky, showing location of Campton or Wolfe County oil district. [1:5,300,000.] Pl. I, "The Campton Oil Pool, Kentucky" by M. J. Munn, *Bull. 471-A*, 1912, pp. 5-13.

KENTUCKY. Sketch Map of Knox County, Kentucky, Showing Location of Oil and Gas Pools. [1:190,000.] [37°2′ - 36°43′; 84°7′ - 83°34′ W.]. With: [geologic] Index map of eastern Kentucky showing location of Barbourville or Knox County oil field. [1:5,300,000.] Pl. IV, "Oil and Gas Development in Knox County, Ky." by M. J. Munn, *Bull. 471-A*, 1912, pp. 14-25.

UTAH. (a) Geologic Map and Sections of San Juan Oil Field, Utah. 1:63,360. [37°19′ - 37°4′ N.; 110°2′ - 109°43′ W.].

(b) Map of San Juan Oil Field. Same scale and coordinates as map (a). With inset of part of Utah showing location of main map.

Pls. VIII and IX, "Geology of the San Juan Oil Field, Utah" by E. G. Woodruff, *Bull. 471-A*, 1912, pp. 72-100.

[Map (b) a valuable contour map (interval 100 feet), affording a new and more correct delineation of the region than does the Abajo, Utah, topographic sheet (1:250,000; contour interval, 250 feet), which goes back partly to the Hayden Survey.]

WYOMING. Map of Powder River Oil Field, Wyoming. By Carroll H. Wegemann, Assisted by C. J. Hares and Wm. Mulholland. [1:63,360.] [43°37′ - 43°20′ N.; 106°40′ - 106°25′ W.]. With inset map of Wyoming, 1:10,000,000, showing location of main map. Pl. VII, "The Powder River Oil Field, Wyoming" by C. H. Wegemann, *Bull. 471-A*, 1912, pp. 52-71.

## NORTH AMERICA

### CANADA

ALBERTA. Maligne Lake, Jasper Park, Alberta. From Survey by Mary F. [*sic*] S. Schäffer. 1911. 1:250,000. [52°45′ N. and 117°35′ W.]. With inset showing location of main map. Accompanies, on p. 380, "Mrs. Schäffer's Discovery of Lake Maligne, Canadian Rockies," *Geogr. Journ.*, Vol. 39, No. 4, 1912, pp. 379-381.

[Valuable map of a lake, hitherto unsurveyed, lying in one of the longitudinal valleys of the outer Rocky Mountains between the transverse courses of the Athabasca and Brazeau Rivers, at the head of the Hudson Bay–Arctic Ocean Divide, within the drainage basin of the latter. Cf. Mrs. Schäffer's "Old Indian Trails (of the Canadian Rockies)", Chapters III-V.]

ALBERTA-BRITISH COLUMBIA. Part of the Rocky Mountains North of the Yellowhead Pass from a plane table survey by Professor J. Norman Collie, F.R.S. 1900-11. 1:500,000. 53°35′ - 52°35′ N.; 120°0′ - 117°30′ W. 3 colors. With inset map, 1:20,000,000, showing general location of main map. Accompanies "Exploration in the Rocky Mountains north of the Yellowhead Pass" by J. N. Collie, *Geogr. Journ.*, Vol. 39, No. 3, 1912, pp. 223-235.

[Valuable map embodying original surveys: an additional contribution to our rapidly increasing knowledge of the Rocky Mountains of Canada for which geography is so greatly indebted to alpinism. Prof. Collie's surveys are the first surveys of an extensive area in this part of the Rocky Mountains due to the opening up of the region by the Grand Trunk Pacific Ry.]

## AFRICA

BECHUANALAND. Ngamiland: Prismatic Compass Sketch Map of Routes between Tsau and Simati's Village by A. G. Stigand. 1910-1911. 1:2,000,000. 18° - 21° S.; 22½° - 24½° E. With inset, 1:40,000,000, showing general location of main map. Accompanies, on p. 377, "Notes on Ngamiland" by A. G. Stigand, *Geogr. Journ.*, Vol. 39, No. 4, 1912, pp. 376-379.

EGYPT. [Six index maps of the various standard maps published by the Survey Department of Egypt, showing state of progress on Jan. 1, 1910, ac-

companying "A List of Maps and Plans Published up to March 1, 1910," Survey Dept., Cairo, 1910:]

(a) Index Map for Topographical Series 1:1,000,000 and for Geological Sheets. 1:4,000,000. 32° - 20° N.; 26⅔° - 36° E. 1 color. Pl. I.

(b) Key Map to the 1:50,000 Sheets of Egypt. [Three plates:] (1) 31°36′ - 29°36′ N.; 29°30′ - 32°30′ E. 2 colors. With inset forming southern extension of main map. 29°36′ - 28°36′ N.; 30°15′ - 31°30′ E. 1 color. (2) [in two parts:] (a) 28°36′ - 26°36′ N.; 30°30′ - 31°52.5′ E. 1 color. (b) 26°36′ - 24°36′ N.; 31°30′ - 33°0′ E. 1 color. (3) 24° - 22° N.; 31°0′ - 33°15′ E. 1 color. With inset forming northern extension of main map. 24°36′ - 24°0′ N.; 32°15′ - 33°15′ E. 1 color. Pls. II, III and IV.

(c) Key Map to the 1:10,000 Sheets of Egypt. 1:750,000. 2 colors. [Five plates:] (a) Lower Egypt. 31°36′ - 30°0′ N.; 29°30′ - 32°30′ E. (b) Delta Barrage to south boundary of Beni Suef. 30°12′ - 28°48′ N.; 30°15′ - 31°30′ E. (c) Mudiria Aswan (North of Shellal). 25°24′ - 24°0′ N.; 32°30′ - 33°3′ E. (d) Kharga. 26°0′ - 24°24′ N.; 30°15′ - 31°0′ E. (e) Mudiria Beheira. [Limits, including inset: 31°36′ - 30°15′ N.; 29°25′ - 30°57′ E.]. Pls. V-IX.

(d) [Key-map to the sheets of] North Gharbia 1:25,000. 1:750,000. 31°36′ - 31°12′ N.; 30°15′ - 32°0′ E. 1 color. Pl. X.

(e) [Key map to the 1:1,000 sheets of] Alexandria. 1:50,000. [31°12′ N. and 29°53′ E.]. Pl. XI.

(f) Provisional Key Map to the 1:1,000 sheets of [N.E.] Cairo. 1:25,000. 2 colors. [30°3′ - 30°5′ N.; 31°16′ - 31°18′ E.]. Pl. XII.

Portuguese Guinea. Sketch showing routes of P. H. G. Powell-Cotton & C. S. Burnett. 1911. 1:1,000,000. 12°30′ - 11°30′ N.; 15°4′ - 14°48′ W. With inset showing location of main map. Accompanies, on p. 396, note on Portuguese Guinea, *Geogr. Journ.*, Vol. 39, No. 4, 1912, pp. 395-397.

Southern Nigeria. Sketch map of part of Southern Nigeria from prismatic compass traverses by Rev. George T. Basden, M.A. 1900-11. 1:200,000. 6°15′ - 5°51′ N.; 6°37′ - 7°16′ E. 1 color. With inset map showing approximate area covered by Ibo tribe. 1:7,500,000. 8⅓° - 3⅓° N.; 4° - 10° E. Accompanies "Notes on the Ibo Country and the Ibo People, Southern Nigeria" by G. T. Basden, *Geogr. Journ.*, Vol. 39, No. 3, 1912, pp. 241-247.

[Valuable detailed map embodying original route surveys.]

## ASIA

China-India. (a) Sketch Map to illustrate the paper on Chinese Frontiers of India by Archibald Rose, H.B.M. Consul, Têng-Yüeh, Yün-nan. 1:15,000,000. 40° - 4° N.; 57° - 108° E. 2 colors.

(b) Sketch Map of the Burma-China Frontier. 1:7,000,000. 31° - 14° N.; 92½° - 103½° E. 2 colors.

Accompany "Chinese Frontiers of India" by A. Rose, *Geogr. Journ.*, Vol. 39, No. 3, 1912, pp. 193-223.

[Distinction made between definite and approximate sections of the frontier.]

Tibet-India. Sketch Map of the route of Capt. F. M. Bailey through South Eastern Tibet and the Mishmi Hills. 1:1,000,000. 29°30′ - 27°40′ N.; 96°20′ - 98°40′ E. 1 color. With inset, 1:20,000,000, showing location of main map. Accompanies "Journey through a Portion of South-Eeastern Tibet and the Mishmi Hills" by F. M. Bailey, *Geogr. Journ.*, Vol. 39, No. 4, 1912, pp. 334-347.

[Valuable route survey of the ill-known region about the constricted upper courses of the Yang-tze, Mekong and Salween Rivers. Route led to the source of the Irrawady.]

Turkey in Asia. A. Philippson: Geologische Karte des westlichen Kleinasien. Blatt 3. 1:300,000. 39°0′ - 37°28′ N.; 25°50′ - 28°10′ E. 23 colors. Accompanies "Reisen und Forschungen im westlichen Kleinasien. II. Heft: Ionien und das westliche Lydien" by A. Philippson, *Ergänzungsheft zu Pet. Mitt., Nr. 172*, 1911.

[The second sheet of this admirable geologic map of western Asia Minor by Prof. Philippson, based mainly on his own surveys. The first sheet was listed under "Asia Minor" in the *Bull.*, Vol. 43, 1911, p. 708. For references to the topographic map which forms the basis of the geologic sheets see *Bull.*, Vol. 43, 1911, pp. 548-549.]

XUM

## AUSTRALASIA AND OCEANIA

PAPUA. Sketch Map showing explorations in the Western Division of Papua by The Hon. Staniforth Smith. 1910-11. 1:750,000. 6°10′-8°0′ S.; 141°55′-145°22′ E. 3 colors. With inset, 1:10,000,000, showing location of main map. Accompanies "Exploration in Papua" by M. S. Smith, *Geogr. Journ.*, Vol. 39, No. 4, 1912, pp. 313-334.

[Valuable extensive route survey of hitherto unexplored tracts.]

QUEENSLAND. (a) Sketch Map of the Burketown Mineral Field showing lease groups & limestone areas. By Lionel C. Ball, B.E., Assistant Gov't. Geologist. 1910. [1:290,000.] [18°22′-19°5′ S.; 138°25′-138°50′ E.]. Accompanies, facing p. 7, "The Burketown Mineral Field" by L. C. Ball, *Publicat. No. 232*, Geol. Survey of Queensland, 1911.

QUEENSLAND. (a) Geological Sketch Map of Einasleigh and Vicinity. [1:31,680.] [18°25′ S. and 144°10′ E.].

(b) Geological Sketch Map, Eastern Portion of Etheridge Goldfield. [1:380,000.] [18°5′-19°10′ S.; 143°50′-144°30′ E.]. 4 colors.

(c) Sketch Plan of Auriferous Area, Oaks G[old] F[ield]. [1:15,840.] [18°55′ S. and 144°15′ E.]. 4 colors.

Accompany "The Oaks and Eastern Portion of the Etheridge Goldfields (Report on)" by E. O. Marks, *Publicat. No. 234*, Queensland Geol. Surv., 1911.

## EUROPE

FRANCE. (a) Carte des Gisements de Coquilles Comestibles de la partie de la côte de la Manche comprise entre Le Havre de St. Germain et l'Anse de Vauville. Dressée par M. L. Joubin, Professeur au Muséum d'Histoire Naturelle à Paris. Nov. 1910. 1:44,500 approx. 49°35′-49°12′ N.; 1°59′-1°37′ W. 7 colors.

(b) ——— comprise entre l'Anse de Vauville à [*sic*] Saint-Vaast. Dressée par ———. 1:44,500 approx. In two parts; inclusive limits: 49°45′-49°34′ N.; 1°59′-1°10′ W. 6 colors.

Accompany "Études sur les Gisements de Coquilles Comestibles des Côtes de France: La Presqu'île du Cotentin" by L. Joubin, *Bull. de l'Inst. Océanogr. de Monaco*, No. 213, July 10, 1911.

[Similar maps listed in *Bull.*, Vol. 43, 1911, under "France" on p. 234 and under "France" (first entry) on p. 392.]

GERMANY. (a) Die Umgebung der Mineralquellen von Germete bei Warburg. 1:25,000. [51°29′ N. and 9°5′ E.]. 17 colors.

(b) Die Umgebung der Solquellen von Calldorf in Lippe. 1:50,000. [52°8′ N. and 8°55′ E.]. 13 colors.

Taf. 5 and 6, "Die Quellen von Germete bei Warburg und von Calldorf in Lippe" by A. Mestwerdt, *Jahrb. der Kgl. Preuss. Geol. Landesanstalt*, Vol. 32, Part I, No. 1, 1911, pp. 145-161.

## POLAR

GREENLAND. (a) Kartenskizze der Umgebung von Karsuarsuk, Nordseite der Halbinsel Nugsuak, N.W. Grönland, topogr. und geol. aufgenommen von Arnold Heim, 3. VIII. 1909. 1:30,000. [70¾° N. and 53° W.]. 8 colors. Oriented S. Pl. IX, "Über die Petrographie und Geologie der Umgebungen von Karsuarsuk" by A. Heim. *Meddelelser om Grönland*, Vol. 47, 1911, pp. 173-228.

GREENLAND. Nordboruiner i Julianehaab Omegn. [1:600,000.] 61°18′-60°23′ N.; 47°12′-45°0′ W. Pl. XXV, "Kirkeruiner fra Nordbotiden m. m. i Julianehaab Distrikt" by M. Clemmensen, *Meddelelser om Grönland*, Vol. 47, 1911, pp. 283-358.

[Map showing the ruins of the ancient Norse settlements in southern Greenland.]

ANTARCTIC. South Polar Regions to illustrate the paper by H. R. Mill, D.Sc., LL.D. 1:40,000,000. Polar cap within 30° S. approx. 1 color. Accompanies "Ten Years of Antarctic Exploration" by H. R. Mill, *Geogr. Journ.*, Vol. 39, No. 4, 1912, pp. 369-375.

[Shows land discovered since 1900.]

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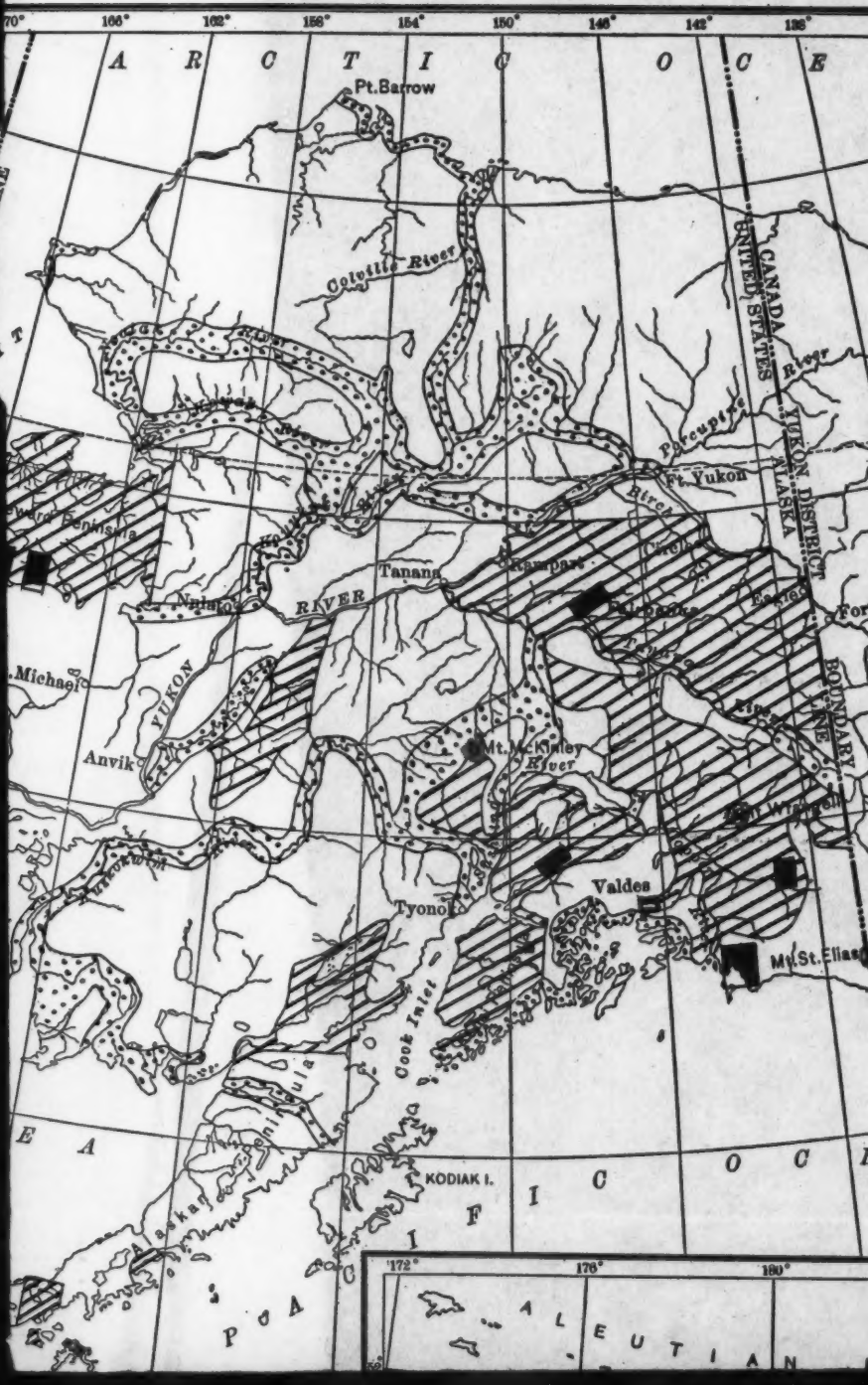
MAP OF
ALASKA
SHOWING AREAS COVERED BY
TOPOGRAPHIC MAPS
Exploratory surveys.....Scale 1:625000
Reconnaissance surveys...Scale 1:250000
Detailed surveys.....Scale 1:62500
SIBERIA
ALASKA
BOUNDARY
LINE
STRAIT
BERING
RUSSIA
UNITED STATES
Seward Peninsula
Nome
St. Michael
YUKON
Anvik
BERING SEA
174°
178°
178°
174°
170°
166°
66°
62°
58°
54°

XUM

162°
158°
154°
150°
146°
142°
138°
134°
R C T I C O C E A N
Pt.Barrow
Colville River
Kobuk River
Koyukuk River
Porcupine River
Ft. Yukon
Birch Creek
Circle
Rampart
Tanana
Nulato
RIVER
YUKON
Ft. Gibbon
Eagle
Fortymile
Dawson
Mt. McKinley
Mt. Wrangell
Valdes
Tyonek
Mt.Logan
Mt.St.Elias
Cook Inlet
KODIAK I.
P A C I F I C O C E A N
172°
176°
180°
176°
A L E U T I A N I S L A N
62°
CANADA
UNITED STATES
YUKON DISTRICT
ALASKA
BOUNDARY

XUM


ARCTIC OCEAN
Pt.Barrow
Colville River
Yukon
Porcupine River
Ft. Yukon
Tanana
RIVER
Nulato
Michael
Anvik
YUKON
Mt. McKinley
River
Valdes
Tyonek
Cook Inlet
Mt. St. Elias
KODIAK I.
Alaska Peninsula
PACIFIC OCEAN
CANADA
UNITED STATES
YUKON DISTRICT
ALASKA
BOUNDARY
LINE
ALEUTIAN
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172°
176°
180°

XUM

138°
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130°
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122°
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CANADA
YUKON DISTRICT
ALASKA
Yukon River
Mackenzie River
ARCTIC CIRCLE
66°
Peel River
Fortymile
Dawson
Macmillan River
Pelly River
Ft. Selkirk
BOUNDARY LINE
Whitehorse
Yukon River
B'D'Y LINE
Mt. Logan
Mt. St. Elias
YUKON DISTRICT
BRITISH COLUMBIA
Dyea
Skagway
Lindeman
Stikine River
58°
C E A N
Ketchikan
54°
180°
176°
172°
N I S L A N D S

XUM

ALASKA
SHOWING AREAS COVERED BY
TOPOGRAPHIC MAPS
Exploratory surveys.....Scale 1:625000
Reconnaissance surveys...Scale 1:250000
Detailed surveys.....Scale 1:62500
SIBERIA
ALASKA
BOUNDARY
LINE
BERING
STRAIT
RUSSIA
UNITED STATES
Seward Peninsula
Nome
Nulato
St. Michael
YUKON
Anvik
BERING SEA
Alaska
PACIFIC
OCEAN
66°
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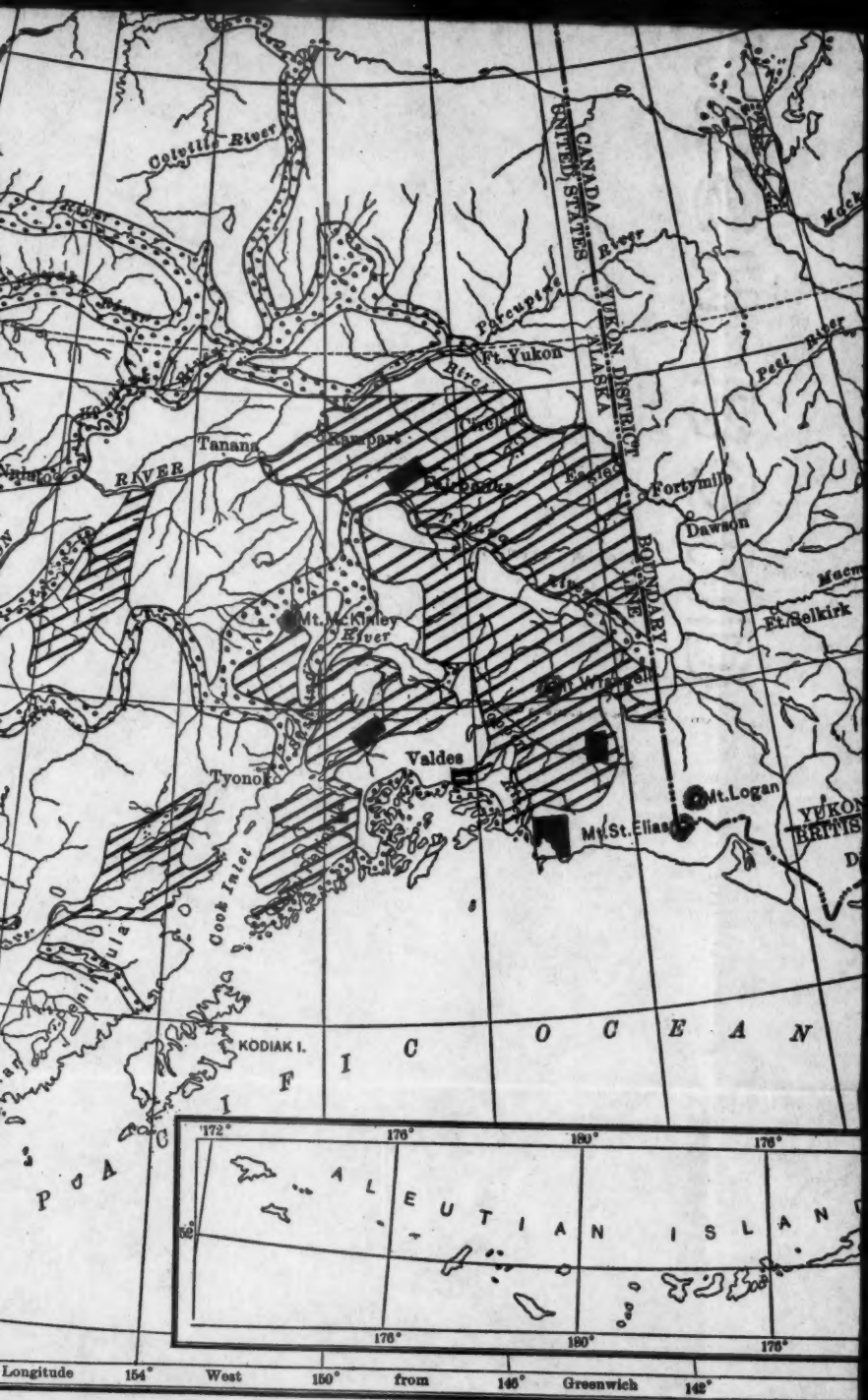
170°
166°
162°
158°
Longitude
100

XUM


Colville River
CANADA
UNITED STATES
YUKON DISTRICT
ALASKA
Porcupine River
Ft. Yukon
Peel River
Tanana
RIVER
Fortymile
Dawson
BOUNDARY
LINE
Mt. McKinley
River
Valdes
Tyonek
Mt. Logan
Mt. St. Elias
Cook Inlet
KODIAK I.
PACIFIC OCEAN
ALEUTIAN ISLANDS
172°
176°
180°
176°
Longitude 154° West 150° from 146° Greenwich 142°
Scale
0 0 100 200 300 400 miles

XUM

Colville River
CANADA
UNITED STATES
YUKON DISTRICT
ALASKA
Porcupine River
Ft. Yukon
Birch
Tanana
RIVER
Nenana
Michael
YUKON
Anvik
Mt. McKinley
River
BOUNDARY
LINE
Valdes
Tyonok
Mt. St. Elias
Cook Inlet
KODIAK I.
Alaska
Peninsula
PACIFIC OCEAN
ALEUTIAN I
172°
176°
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52
158° Longitude 154° West 150° from 140° Greenwich
Scale
100 0 100 200 300 400 miles

XUM

ARCTIC CIRCLE
Mackenzie River
Peel River
YUKON DISTRICT
Fortymile
Dawson
Macmillan River
Pelly River
Ft. Selkirk
Teslin
White Horse
B'D'Y LINE
YUKON DISTRICT
BRITISH COLUMBIA
Mt. Logan
St. Elias
Dyea
Skagway
Juneau
Stikine River
Ketchikan
66°
62°
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176°
172°
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142°
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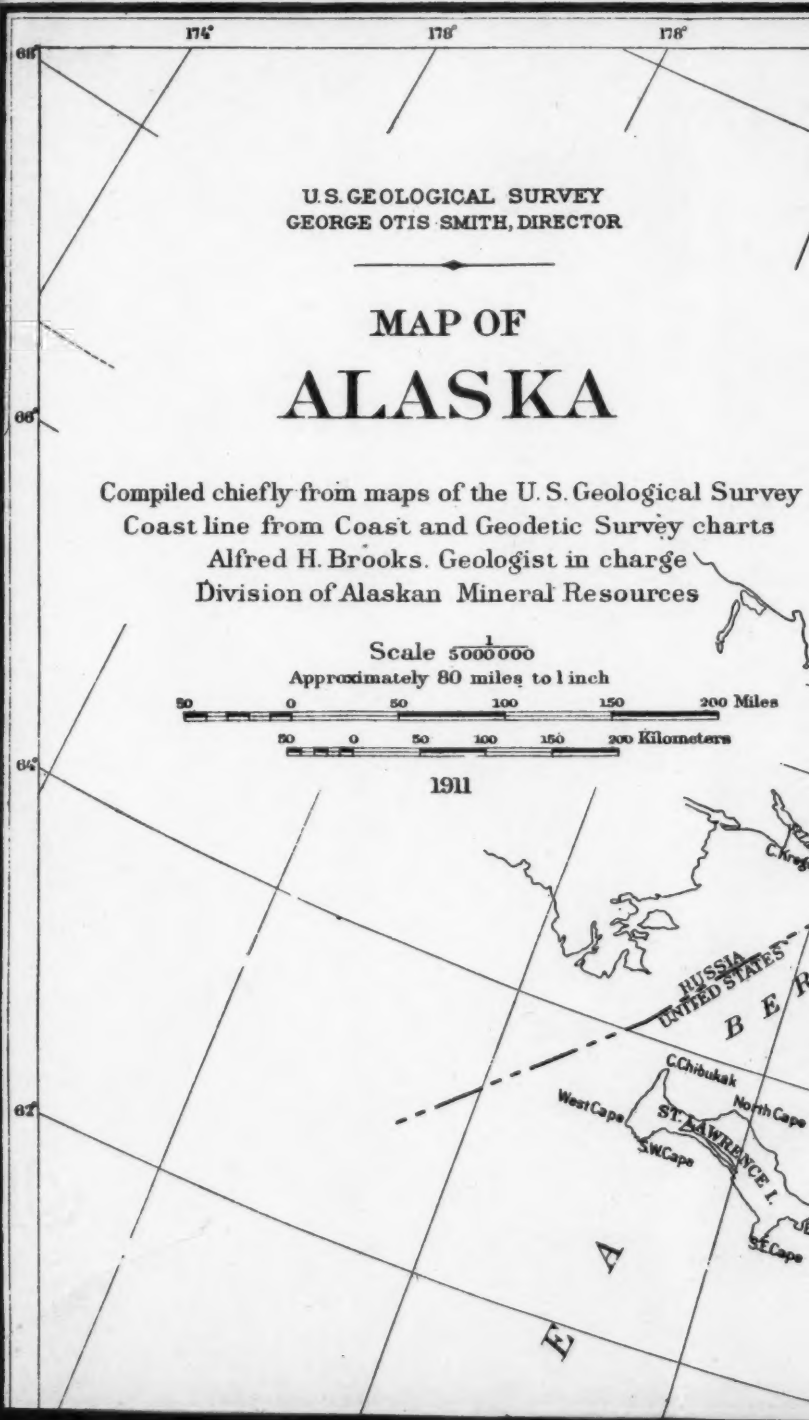
130°

XUM


174°
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U.S. GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR
MAP OF
ALASKA
Compiled chiefly from maps of the U. S. Geological Survey
Coast line from Coast and Geodetic Survey charts
Alfred H. Brooks. Geologist in charge
Division of Alaskan Mineral Resources
Scale 1/5000000
Approximately 80 miles to 1 inch
50 0 50 100 150 200 Miles
50 0 50 100 150 200 Kilometers
1911
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UNITED STATES
BERING SEA
C. Chibukak
West Cape
North Cape
ST. LAWRENCE I.
S.W. Cape
S.E. Cape
ALASKA
GULF OF ALASKA

174°
170°
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STRAIT
BERING
Wainwright Inlet
Icy Cape
Pt Lay
C Lisburne
C Sabine
Pt Hope
C Thompson
C Seppings
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C Krusenstern
NOATAK RIVER
BAIRD MOUNTAINS
KOTZEBUE SOUND
Kikitaruk
C Blossom
C Espenberg
East Cape
Shishmaref Inlet
C Nuniamo
Cape Prince of Wales
SEWARD PENINSULA
Port Clarence
Teller
Shelton
C Douglas
C Rodney
Sledge I
Nome
Wireless Sta.
Council
Solomon
Safety
Golofnin
NORTON BAY
C Darby
C Deadlich
Rocky Pt
Bering Bay
Beboro I
NORTON SOUND
North Cape
WRENCE I.
N E Cape
East Cape
S E Cape
Stuart Is
St Michael
Wireless Sta.
Pt Romanof
Wireless Sta.
Kaltag
Unalakleet
YUKON
KAIYUH
MOUNTAINS
Innoko
Nulato
Koyuk R.
Kuk R.
Utukok R.
Kokolik R.
Kukpuk R.
Corwin Coalmine
Corwin Lagoon
Hulik R.
Kivalina
Candle
Buckland R.
Noatak
Kobuk
Selawik Lake
Selawik River
Chorik Peninsula
Goodhope Bay
Deering
Kiwalik
Kuzitrin
Nulato
Ungalik R.
Fossil R.
Gisasa R.
Anvik River
Innoko
Ruby
Rio
Ungalik R.
Kuzitrin R.
Koyuk River
Buckland R.
Kobuk R.
Selawik R.
Noatak R.
Squirrel R.
Kivalina R.
Kobuk R.
Utukok R.
Kokolik R.
Hotham Inlet
Kotzebue Sound
Shishmaref Inlet
Port Clarence
Grantley Harbour
Teller
Nome
Safety
Solomon
Council
Golofnin
Rocky Pt
Bering Bay
C Darby
C Deadlich
Beboro I
Stuart Is
St Michael
Wireless Sta.
Pt Romanof
Wireless Sta.
Kaltag
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Nulato
Innoko
Anvik River
Ruby
Rio
Franklin
Kobuk R.
Utukok R.
Kokolik R.
Kukpuk R.
Corwin Lagoon
Hulik R.
Noatak
Kivalina
Candle
Buckland R.
Selawik Lake
Selawik River
Chorik Peninsula
Goodhope Bay
Deering
Kiwalik
Kuzitrin
Nulato
Ungalik R.
Fossil R.
Gisasa R.
Koyuk River
Buckland R.
Kobuk R.
Selawik R.
Noatak R.
Squirrel R.
Kivalina R.
Kobuk R.
Utukok R.
Kokolik R.
Hotham Inlet
Kotzebue Sound
Shishmaref Inlet
Port Clarence
Grantley Harbour
Teller
Nome
Safety
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Council
Golofnin
Rocky Pt
Bering Bay
C Darby
C Deadlich
Beboro I
Stuart Is
St Michael
Wireless Sta.
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Wireless Sta.
Kaltag
Unalakleet
Nulato
Innoko
Anvik River
Ruby
Rio

XUM

162°
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Barrow
Pt Barrow
Tangent Pt.
Franklin Pt.
Pearl Bay
Wainwright Inlet
Icy Cape
Kuk R.
Middle Fork
Inaru River
Smith Bay
Halkett C.
Harrison Bay
Jones Is.
Cowdyr Bay
Midway Is.
Anxiety Pt.
Nigalik
Utukok R.
Colville River
Killowra R.
Sagavanirktok River
Chandler Lake
Anaktuvuk River
Itkillik R.
Middle Fork
East Fork
Caro
Chandalar R.
Bettles
Jim R.
ARCTIC
CIRCLE
Allakakat
Kanuti River
Hughes I.
Koyukuk R.
Melozitna River
Ruby
Ramparts
Ft Gibbon
Tanana
Wireless Sta.
Hot Springs
TELEGRAPH
TRAIL
Nulato
Kaltag
Yukon River
Kaiyuh Mountains
Ophir
Lake Minchumina
North Fork
Tatlathna R.
Chedetlothna R.
Tonzona R.
Mt McKinley
Kantishna River
Toklat R.
Nenana River
Tolovana River
Chatanika River
Chena
Fairbanks
Idirelle
Kobuk R.
Selawik R.
Noatak R.
Kobuk Mountains
Buckland R.
Kateel R.
Glacier R.
Reindeer R.
Koyukuk R.
Yukon R.

XUM

146°
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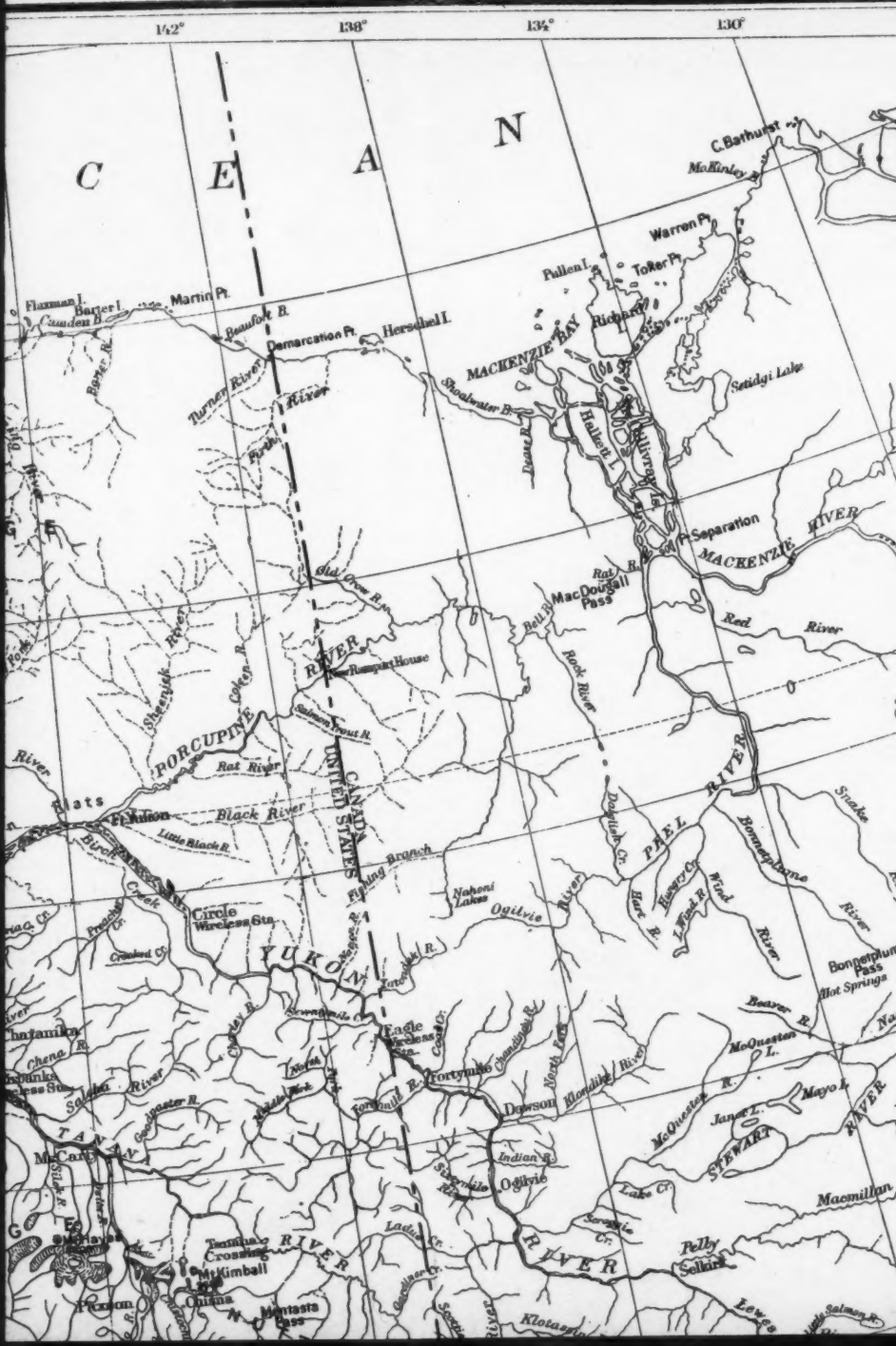
O C E A N
Anxiety Pt.
Flaxman I.
Barter I.
Martin Pt.
Camden B.
Beaufort B.
Demarcation Pt.
Herschel I.
Warren Pt.
Pullen I.
Toker Pt.
MACKENZIE BAY
Richards I.
Shoalwater Pt.
Lower L.
Halkett L.
Oliver L.
Pt. Separation
MACKE
Old Crow R.
Rat R.
MacDougall Pass
Red
Rampart House
Bell R.
Rock River
PORCUPINE
Salmon Trout R.
Rat River
Flats
Black River
Little Black R.
Fishing Branch
Nahoni Lakes
Ogilvie
PEEL RIVER
Hart R.
Blow Cr.
Wind
Circle Wireless Sta.
YUKON
Creek
Crooked Cr.
Eagle Wireless Sta.
Chatanika River
Chena R.
Fairbanks
Salcha River
Goodpaster R.
Fortymile R.
Fortymile
Dawson
Klondike River
North Fork
McQuesten R.
Jappa L.
STEWART
Indian R.
McCarty
Ogilvie
Lake Cr.
Matanuska
Tanana Crossing
Mt. Kimball
Chitina
Ladue Cr.
RIVER
Pelly
Selkirk
Klotassin
Lewes

XUM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Flaxman I.
Barter I.
Camden B.
Martin Pt.
Beaufort B.
Demarcation Pt.
Herschel I.
MACKENZIE BAY
Richards I.
Shoalwater B.
Stridgi Lake
Hallett I.
Liverpool Bay
Pt. Separation
MACKENZIE RIVER
Rat R.
MacDougall Pass
Red River
Bell R.
Rock River
Old Crow R.
Rampart House
Salmon Trout R.
PORCUPINE RIVER
Rat River
Flats
Ft. Yukon
Black River
Little Black R.
Birch Creek
Circle
Wireless Sta.
UNITED STATES
CANADA
Fishing Branch
Nahoni Lakes
Ogilvie River
Dolomite Cr.
PEEL RIVER
Hart R.
Heavy Cr.
L. Fred R.
Fred River
Bonnet Plume River
Snake
Bonnet Plume Pass
Hot Springs
Beaver R.
McQuesten L.
McQuesten R.
Mayo L.
Mayo
Janet L.
STEWART RIVER
Macmillan
Lake Cr.
Scougale Cr.
Pelly
Selkirk
Lewes
Klotassin
Ladue Cr.
Indian R.
Ogilvie
Sixtymile
Dawson
Klondike River
North Fork
Chandindu R.
Forty Mile
Eagle
Yukon Flats
Yukon
Charley R.
Seventymile Cr.
Mission Cr.
Tanana
Chena R.
Chena
Salcha River
Goodpaster R.
Delta River
Tanana R.
McCarthy
Fairbanks
Silk R.
Eagle
Tanana Crossing
Mt. Kimball
Healy
Nenana
Minto
Manley Hot Springs
Montana Pass
Ophir
Creek
Gravel Cr.
Preacher Cr.
Chatanika
Chatanika R.
Goldstream Cr.
Fox
Ester
Ester Dome
Cleary Cr.
Cleary R.
Slate Cr.
Fairbanks
Creek
Gilmore Dome
Gilmore Cr.
Gilmore Creek
Gilmore Dome
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Gilmore Creek
Gilmore Dome
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Gilmore

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RIVER
River
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River
River
Bonnetplume
Pass
Hot Springs
Nadalein R.
River
Mayo L.
RIVER
East
River
Macmillan
River
River
Salmon R.
Mayo Branch
Pelly Lakes
McEvoy Lake

XUM

60°
56°
54°
52°
170°
165°
BERING S
Hall I.
St.Matthew I.
Spanman Bay
C.Romanzof
Pt.Dall
Hooper Bay
C.Mohican
C.Vancouver
C.Etolin
Nunivak I.
C.Mendenhall
C.Corwin
St.Paul I.
Walrus I
Otter I.
PRIBILOF Is.
St.George I
ALEUTIAN ISLANDS
FOX ISLANDS
Amak I.
C.Lapin
Shishaldin Vol.
Pogromni Vol.
C.Sarichef
UNIMAK I.
C.Lazaref
Bogoslof I.
Akutan I.
Akun I.
Udaktak I.
C.Tanak
Makushin H.
Biorka I.
UNALASKA I.
Umnak I.
Umnak Pass
Ulaga I.
Carlisle I.
Kagamil I.
Yunaska I.
Chuginadak I.
Chugul I.
Amukta I.
Herbert I.
Amukta Pass
ISLANDS OF THE FOUR MOUNTAINS

XUM

Andreafski
Holy Cross
Russian Mission
Kashunuk River
Mountain River
Azun R.
Hazen Bay
Nelson I.
Baird Inlet
Etolin
C. Vancouver
C. Corwin
Kinak R.
Kuguklik R.
C. Avinof
KUSKOKWIM BAY
Goodnews Bay
Portage Bay
C. Nowenham
Bethel
Kwikh R.
KUSKOKWIM
Kanektok R.
Togiak R.
Togiak Bay
Togiak L.
Agulukpak L.
Aleknagik L.
Nushagak R.
Nushagak
Etolin Pt.
C. Constantine
BRISTOL BAY
Naknek
Naknek L.
Kvichak R.
Iliamna Lake
Iliamna L.
Kukaklek L.
Katmai
Douglas
Valle B.
Ugashik
Ugashik R.
Ugashik L.
Portage B.
Kaflagvik R.
SHELIKOF STRAIT
Karluk
Port Heiden
Seal Is.
Ugashik R.
Chignik R.
Chignik
Chignik Bay
Sutwik I.
Tugidak I.
Trinity Is.
Kudobin Is.
Semidi Is.
Amak I.
Stepovak Bay
Korovin I.
Popof I.
Unga
Dolgoi I.
Deer I.
Nagai I.
Kombiji Is.
C. Lazaref
C. Pankof
Sannak Is.
SHUMAGIN IS.
Mitrofania I.
Chirikof I.
NORTH
162°
158°
154°

XUM

Iditarod
Mt. Russell
Mt. Dall
Yentna River
Susitna
Cook Inlet
Chugach
Valdez Glacier
Port Campbell
Bruce
Kenai
Seward
Prince William Sound
Tuxedni Lakes
Redoubt Pk.
Hiamna Pk.
Iliamna Lake
Iliamna B.
Port Graham
Augustine I.
Homer
Kachemak B.
Selo Bay
Nushagak
Nushagak B.
Etolin Pt.
Naknek
Naknek L.
C. Constantine
Kamishak Bay
Shaw I.
C. Douglas
Barren Is.
Pt. Banks
Douglas
Katmai
Marmot I.
Marmot B.
Shelikof Strait
Kodiak I.
Kodiak
Uganik
Uganik L.
Karluk
Karluk L.
Sitkalidak I.
Sutwik I.
Chignik Bay
Chignik
Trinity Is.
Tugidak I.
Semidi Is.
Chirikof I.
Aniakchak B.
Alaska Peninsula
North Pacific
Gulf of Alaska
C. Wrangell
Attu
Chichagof Harbor
Sarana Bay
Semichi Is.
Near Islands
Agattu I.
Buldir I.
Rat Islands
North Pacific
174°
East of Greenwich
154°
West of Greenwich
150°

Christochina
Wrangell
Copper Center
Klutina L.
Valdez
Valdez Glacier
Ellamar
Katalla
Controller Bay
C. Suckling
Kayak I.
C. St Elias
Middleton I.
Nizina
Nizina R.
Chitina R.
Wellesley
Nisling River
White
Donjek River
Mishilik L.
Kluane L.
Mt Logan
ST. ELIAS
Chilkat Pass
Chilkoot
Haines
Yakutat Bay
Ocean C.
Yakutat
C. Fairweather
Icy Pt
C. Spencer
Cross Sound
C. Edward
Salisbury Sound
Kruzof I.
MILITARY CABLE
ULF OF ALASKA
FIC OCEAN
178°
178°
174°
BERING SEA
LEUTIAN ISLANDS
Chugul I.
Rasstof I.
Semisopochnoi I.
Little Sitkin I.
Rat I.
Amchitka I.
Gareloi I.
Tanaga I.
Unalga I.
Kanaga I.
Ulak I.
Ilak I.
Amatignak I.
Great Sitkin I.
Kasatochi I.
Koyuin Bay
Seguam I.
Amlia I.
Umak I.
ANDREANOF ISLANDS
PACIFIC OCEAN
West of Greenwich
146°
142°
138°

XUM

GULF OF ALASKA
PACIFIC OCEAN
BERING SEA
ALEUTIAN ISLANDS
RAT ISLANDS
ANDREANOF ISLANDS
PACIFIC OCEAN
MILITARY CABLE
Chistochina
Wrangell
Copper Center
Valdez
Glacier
Ellamar
Cordova
Katalla
Nizina
Chitina
Kennecott
McCarthy
Kotsina
Chitina R.
Nizina R.
Klutina L.
Tonsina
Tazlina L.
Copper R.
Gulkana
Paxson
Summit
Meadows
Donnelly Dome
Mt. Logan
Mt. St. Elias
Mt. Vancouver
Mt. Hubbard
Mt. Cook
Mt. Fairweather
Malaspina Glacier
Seward Glacier
Agassiz Glacier
Hubbard Glacier
Yakutat Bay
Yakutat
Ocean C.
Controller Bay
C. Suckling
C. Yakataga
C. St. Elias
Kayak I.
C. Cleare
Middleton I.
C. Fairweather
Icy Pt.
C. Spencer
Cross Sound
C. Edward
Salisbury Sound
Kruzof
Nabesna
Slana
Tok Cut-off
Tok
Tetlin
Northway
Tanacross
Dot Lake
Delta
Big Delta
Fairbanks
Eielson
Nenana
Healy
Lignite
Cantwell
Talkeetna
Gulkana
Glennallen
Valdez
Whittier
Seward
Kodiak
Kenai
Anchorage
Matanuska
Palmer
Wasilla
Willow
Talkeetna
Trapper Creek
Petersville
Susitna
Susitna R.
Yentna
Skwentna
Skwentna R.
Tyonek
Kasilof
Homer
Seldovia
Port Graham
Nanwalek
Port Dick
Chenik
Iliamna
Iliamna L.
Lake Clark
Lake Clark Pass
Kijik
Nondalton
Pedro Bay
Pile Bay
Newhalen
Newhalen R.
Kokhanok
Kokhanok Bay
Kokhanok L.
Chilikadrotna R.
Chilikadrotna
Chilikat Pass
Chilkoot Pass
Haines
Skagway
Dalton Post
Klukwan
Kluane L.
Aishihik L.
Aishihik
Stevenson Lake
Donjek River
White R.
Nisling River
Wellesley L.
Lake Laberge
Whitehorse
Carmacks
Kusawa L.
Lbennett
Teslin
Teslin L.
Atlin
Atlin L.
Dease L.
Dease Lake
Stikine R.
Telegraph Creek
Wrangell
Petersburg
Ketchikan
Prince Rupert
Queen Charlotte Is.
Dixon Entrance
Hecate Strait
Baldur I.
Chugul I.
Khwostof I.
Semisopochnoi I.
Little Sitkin I.
Rat I.
Amchitka I.
Gareloi I.
Tanaga I.
Unalga I.
Kavalga I.
Ulak I.
Ilak I.
Amatignak I.
Great Sitkin I.
Kasatochi I.
Koniuji I.
Kanaga I.
Adak
Umak I.
Chugul I.
Amlia
Greenwich
West of Greenwich
146°
142°
138°
178°
178°
174°

XUM

YUKON TERRITORY
BRITISH COLUMBIA
COAST RANGE
ALEXANDER ARCHIPELAGO
DIXON ENTRANCE
HECATE STRAIT
IPHIGENIA BAY
Christian Sound
Coronation I.
Kruzof I.
Salisbury Sound
C. Edward
Chichagof I.
Baranof I.
Sitka
Wrangell
Petersburg
Ketchikan
Prince of Wales I.
Dall I.
C. Muzon
C. Chacon
Graham I.
Tongass Narrows
Revillagigedo I.
Tuya R.
Taku R.
Stikine R.
Iskut R.
Unuk R.
Chickamin R.
Nass R.
Skeena R.
Portland Canal
Observatory Inlet
Behm Canal
Clarence Strait
Sumner Strait
Frederick Sound
Stephens Passage
Lynn Canal
Chilkoot Pass
White Pass
Skagway
Haines
Atlin
Atlin L.
Tagish L.
Teslin L.
Teslin River
Lake Labarge
Quiet L.
Rose River
Nisutlin Bay
Whitehorse
L. Marsh
L. Bennett
Carcross
Surprise L.
Jennings R.
Frances L.
Dease L.
Dease R.
Thibert R.
Shesley River
Inklin R.
Sloko R.
Kutlin Cr.
Duncan Cr.
Chilkoot R.
Dyea
Juneau
Douglas I.
Hoonah
Admiralty I.
Kuiu I.
Kupreanof I.
Kake
Petersburg Sta.
Wrangell Sta.
Loring
Ketchikan Sta.
Sitka Sta.
Baranof Sta.
Seguam I.
Seguam Pass
Amlia I.
Amukta Pass
Amukta Bad
ISLANDS
A N
138°
136°
134°
132°
130°
60°
58°
56°
54°
52°
174°
172°
52°

XUM